Tuula Siira

VALUE CREATION BY ENTERPRISE SYSTEMS VALUE ADDED RESELLERS

THE CASE OF PLM SYSTEMS VARS
TUULA SIIRA

VALUE CREATION BY ENTERPRISE SYSTEMS VALUE ADDED RESELLERS
The Case of PLM Systems VARs

Academic dissertation to be presented with the assent of the Doctoral Training Committee of Technology and Natural Sciences of the University of Oulu for public defence in OP-Pohjola-sali (Auditorium L6), Linnanmäki, on 16 November 2012, at 12 noon

UNIVERSITY OF OULU, OULU 2012
Abstract

This study examines value creation by value added resellers (VARs) in the context of the enterprise systems business, with particular respect to product lifecycle management (PLM) systems. The purpose of the study is to increase theoretical and empirical understanding of value creation in this specific context by integrating the enterprise systems theory, the software ecosystems theory, the software business model theory, and the value creation theory.

The theoretical framework assumes the perspective of the VARs, and examines their interactions with customers and suppliers during the value creation process. The customers and suppliers are the parties that perceive the value created by the VAR. The primary objective is to determine how and why the VAR creates value in the perception of its customers and suppliers.

The method includes a qualitative case study research strategy in which empirical data were collected primarily through interviews with highly knowledgeable informants within three VAR organizations, five customer organizations, and five supplier organizations. Each source viewed the scope of the research questions from a diverse perspective.

As a result of the empirical analysis, value creation by the VAR value was connected to the VAR type, the value creation strategy, and the business model. The VAR's strategy results from synergy and synchronization with its PLM system.

The customer-perceived value is, in part, the value created by the VAR-customer business relationship. It is also partially specific to the customer type. A VAR creates value for its customers because its product and service offerings fulfill customer needs, and because it offers abilities, knowledge, expertise, and experience of interest to its customers. The most advanced value creation occurs when the business relationship is a source of co-value creation that creates value for both parties.

The supplier-perceived value is also partially specific to the supplier type. The VAR-supplier business relationship creates value for suppliers because the VAR extends the supplier's market presence, offers market and customer knowledge, and creates new business opportunities.

This study is context-dependent and geographically and culturally focused on Nordic countries. The results reflect the contexts of the three research cases and their geographical and cultural areas, and as such are not generalizable.

Keywords: enterprise systems, software product business, value added reseller, value creation
Tiivistelmä

Tutkimus keskittyy lisäarvoa tuottavien jälleenmyyjien (VAR) arvontuotantoon yritysjärjestelmien liiketoimintakontekstissa ja siinä erityisesti tuotteen elinkaaren hallintajärjestelmien liiketoimintakontekstissa. Tutkimuksen tarkoitus on lisätä sekä teoreettista että empiiristä ymmärrystä arvontuotannosta integroimalla yritystietojärjestelmä-, ohjelmistoe kosysteemi-, ohjelmistoliiketoimintamalli- ja arvontuotantoteorioita.


Tutkimustulokset osoittavat, että VAR:n arvon tuottaminen on riippuvainen VAR:n tyyppistä, sen arvontuotantostrategiasta sekä sen liiketoimintamallista. VAR:n strategia on synkronoitu sen PLM järjestelmätoimittajan strategiaan.


Arvontuotanto on osittain riippuvainen toimittajan tyypistä. VAR tuottaa arvoa toimittajilleen, koska se laajentaa niiden läsnäoloa markkinoilla, tuntee markkinan ja niiden asiakkaat sekä luo uusia liiketoimintamahdollisuuksia.

Tutkimus on kontekstiriippuvainen. Se on maantieteellisesti ja kulttuurillisesti keskittyynyt Pohjoismaihin. Tutkimuksen tulokset heijastavat kolmea tutkimustapausta ja niiden maantieteellistä ja kulttuurillista taustaa eikä sen takia ole sellaisenaan yleistettävissä.

Asiasanat: arvontuotanto, lisäarvoa tuottava jälleenmyyjä, ohjelmistotuoteliiketoiminta, yritysjärjestelmä
I want to dedicate this doctoral thesis to the memory of
my father Urpo Karjalainen
and
my curly coated retriever Tessa (Caballus Josephine)
Acknowledgements

It is time to return my gratitude and close this 10-year period of my life, which has resulted in the completion of two academic degrees. My journey into the world of scientific research has been challenging at times, but always interesting, and has allowed me to achieve my goals with pride and satisfaction.

I would like to thank the reviewers of my thesis, Professor Pasi Tyrväinen and Dr. Risto Rajala, for their valuable and insightful comments. My supervisors, Dr. Juhani Warsta and Professor Veikko Seppänen, stood by me throughout the entire journey. They gave me guidance and pulled me, time and time again, out of the depths of despair. I will be forever grateful to them.

I would also like to express my gratitude to Ahti Pekkala Säätiö and the Foundation for Economic Education, for continuously providing me with financial support throughout the course of my doctoral studies and thesis work.

A special thanks goes to my colleague, Dr. Niklas Adamsson, for his support, encouragement and constructive comments throughout the process. I have been lucky enough to collect most of my empirical research through interviews with leading experts in the field, and without their contribution and commitment, my thesis work would not have been attainable.

I thank you all for everything you have done to make my journey into the world of scientific research gratifying, memorable and most of all, possible. Thank you.

Kiiminki, September 2012

Tuula Siira
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>ASD</td>
<td>Application Software Developer</td>
</tr>
<tr>
<td>ASP</td>
<td>Application Service Provider</td>
</tr>
<tr>
<td>B2B</td>
<td>Business-to-Business</td>
</tr>
<tr>
<td>BPR</td>
<td>Business Process Re-engineering</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CFO</td>
<td>Chief Financial Officer</td>
</tr>
<tr>
<td>CIO</td>
<td>Chief Information Officer</td>
</tr>
<tr>
<td>CoPS</td>
<td>Complex Product and System</td>
</tr>
<tr>
<td>CPG</td>
<td>Consumer Packaged Goods</td>
</tr>
<tr>
<td>CRM</td>
<td>Customer Relationship Management</td>
</tr>
<tr>
<td>CTO</td>
<td>Chief Technology Officer</td>
</tr>
<tr>
<td>ECM</td>
<td>Electronic Content Management</td>
</tr>
<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
</tr>
<tr>
<td>ES</td>
<td>Enterprise System</td>
</tr>
<tr>
<td>F2F</td>
<td>Face-to-Face</td>
</tr>
<tr>
<td>F&amp;B</td>
<td>Food and Beverage</td>
</tr>
<tr>
<td>HW</td>
<td>Hardware</td>
</tr>
<tr>
<td>HW-D</td>
<td>Hardware Developer</td>
</tr>
<tr>
<td>IS</td>
<td>Information Systems</td>
</tr>
<tr>
<td>ISD</td>
<td>Infrastructure Software Developer</td>
</tr>
<tr>
<td>ISP</td>
<td>Infrastructure Service Provider</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>MRP</td>
<td>Materials Requirement Planning</td>
</tr>
<tr>
<td>PDM</td>
<td>Product Data Management</td>
</tr>
<tr>
<td>PLM</td>
<td>Product Lifecycle Management</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on Investment</td>
</tr>
<tr>
<td>SaaS</td>
<td>Software as a Service</td>
</tr>
<tr>
<td>SCM</td>
<td>Supplier Chain Management</td>
</tr>
<tr>
<td>SLA</td>
<td>Service Level Agreement</td>
</tr>
<tr>
<td>SME</td>
<td>Small and Medium-Sized Enterprise</td>
</tr>
<tr>
<td>SOA</td>
<td>Service-Oriented Architecture</td>
</tr>
<tr>
<td>SSN</td>
<td>Software Supply Network</td>
</tr>
<tr>
<td>SW</td>
<td>Software</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>TRV</td>
<td>Total Relationship Value</td>
</tr>
<tr>
<td>VAP</td>
<td>Value Added Partner</td>
</tr>
<tr>
<td>VAR</td>
<td>Value Added Reseller</td>
</tr>
<tr>
<td>VC</td>
<td>Value for the Customer</td>
</tr>
<tr>
<td>VCS</td>
<td>Value Creation System</td>
</tr>
<tr>
<td>Y2K</td>
<td>Year 2000</td>
</tr>
</tbody>
</table>
## Contents

Abstract
Tiivistelmä
Acknowledgements 9
Abbreviations 11
Contents 13

1 Introduction 19
   1.1 Background and Motivation for the Study .............................................. 19
   1.2 Research Problem and Research Questions ............................................ 22
   1.3 Outline of the Research ........................................................................... 23

2 PLM Systems – an Application Area of Enterprise Systems 27
   2.1 Software as a Product – Software Product .............................................. 29
   2.2 Definition of Enterprise Systems ............................................................ 33
   2.3 Common Characteristics of Enterprise Systems ..................................... 39
   2.4 PLM Systems .......................................................................................... 41
      2.4.1 PLM Capabilities .......................................................................... 42
      2.4.2 Benefits of PLM Systems ............................................................. 47
      2.4.3 PLM History ................................................................................. 55
      2.4.4 PLM System Implementation....................................................... 56

3 Software Product Business Environment 63
   3.1 Software Ecosystems .............................................................................. 64
      3.1.1 Software Supply Networks ........................................................... 71
      3.1.2 Network Management ................................................................. 76
   3.2 Suppliers ................................................................................................. 78
   3.3 Intermediaries.......................................................................................... 81
      3.3.1 Tasks of the Intermediary ............................................................. 83
      3.3.2 Sales Channel Actors .................................................................... 84
      3.3.3 Application Service Providers and Infrastructure Service Providers ................................................................. 86
      3.3.4 VARs ............................................................................................ 87
   3.4 Consultants .............................................................................................. 91
   3.5 Customers ............................................................................................... 93
   3.6 Partners ................................................................................................... 95
   3.7 Competitors ............................................................................................. 96
   3.8 Public Bodies .......................................................................................... 97

4 Value Creation in Software Product Business 99
4.1 Definition of Value ................................................................. 100
  4.1.1 Customer Value ................................................................. 101
  4.1.2 Supplier Value ................................................................. 105
  4.1.3 Business Relationship Value .............................................. 109
4.2 Concept of Value Creation .................................................... 118
  4.2.1 Value Creation Strategies .................................................. 119
  4.2.2 Value Creation Systems ...................................................... 122
  4.2.3 Value Creation Functions .................................................. 125
4.3 Concept of Value Capturing ..................................................... 134
  4.3.1 Software Product Business Models ..................................... 134
  4.3.2 Business Model Elements .................................................. 136
  4.3.3 Business Model Selection .................................................. 141
5 Model of VAR Value Creation in the PLM Systems Context 145
  5.1 PLM Systems Context ............................................................ 145
    5.1.1 Supply Network and Delivery Network .............................. 146
    5.1.2 Context Elements ............................................................ 147
  5.2 Suppliers ................................................................................... 148
    5.2.1 Supplier Business Goals ................................................... 149
    5.2.2 Supplier Offering ............................................................... 150
    5.2.3 VAR-Supplier Value ........................................................... 150
  5.3 VAR ....................................................................................... 152
    5.3.1 Value Creation Strategy ..................................................... 154
    5.3.2 Business Model ................................................................. 155
    5.3.3 Value Creation Functions ................................................... 156
    5.3.4 VAR-Supplier Business Relationship ................................... 156
  5.4 Customers .............................................................................. 157
    5.4.1 Customer Business Goals .................................................. 158
    5.4.2 VAR Offering ................................................................. 159
    5.4.3 VAR-Customer Value ......................................................... 159
    5.4.4 VAR-Customer Business Relationship ................................ 161
  5.5 Summary .................................................................................. 162
6 Research Design 165
  6.1 Research Approach ............................................................... 166
  6.2 Research Method ................................................................. 167
    6.2.1 An Explanatory Case Study ............................................... 167
    6.2.2 A Multi-Case Study with Embedded Units ......................... 169
6.2.3 Case and Unit of Analysis Selection ..................................................... 170
6.3 Research Process ..................................................................................... 172
6.3.1 Empirical Data Collection .................................................................... 174
6.3.2 Modes of Empirical Data Analysis ...................................................... 176

7 Empirical Data Within-Unit Analysis ...................................................... 181
7.1 PLM Systems Context ............................................................................. 181
7.1.1 Supply Network ................................................................................... 183
7.1.2 Delivery Network ............................................................................... 184
7.1.3 Context Elements ............................................................................. 185
7.2 Suppliers .................................................................................................. 186
7.2.1 Supplier Offering ............................................................................... 187
7.2.2 Supplier Business Goals .................................................................... 190
7.2.3 VAR-Supplier Value ......................................................................... 191
7.2.4 Supplier-Customer Business Relationship ...................................... 195
7.3 VAR ........................................................................................................... 195
7.3.1 Value Creation Strategy .................................................................... 197
7.3.2 Business Model ............................................................................... 199
7.3.3 Value Creation Functions ................................................................. 206
7.3.4 VAR-Supplier Business Relationship .............................................. 212
7.4 Customers ............................................................................................... 215
7.4.1 Customer Business Goals .................................................................. 216
7.4.2 VAR Offering .................................................................................... 219
7.4.3 VAR-Customer Value ....................................................................... 221
7.4.4 VAR-Customer Business Relationship .......................................... 223

8 Cross-Unit Analysis .................................................................................. 227
8.1 VAR’s Main Supplier Types are PLM Vendor and Supplier ..................... 227
8.2 Supplier Offering Varies from PLM System Platform to Project Resources ................................................................. 228
8.2.1 PLM Vendor Offering Is Based on PLM System Platform .............. 228
8.2.2 Supplier Offering has Large Variation in Content ......................... 229
8.3 Suppliers’ Business Goal is to Grow but Implementation Differs .......... 230
8.4 VAR-Supplier Relationship – From Unequal to Win-Win-Win Relationship ...................................................................................... 231
8.4.1 VAR-PLM Vendor Business Relationship has Several Building Blocks ...................................................................................... 231
8.4.2 VAR-Supplier Business Relationship – From Competitive to Coopetitive ................................................................................... 232
8.5 VAR-Supplier Value is Financial, Knowledge Sharing, and Strategic Value in Nature................................................................. 234
  8.5.1 Supplier-Created Value is Cost Reduction, Improved Quality, and Productivity in Nature ..................................................... 235
  8.5.2 Supplier-Perceived Value is Performance-Related ....................... 238
  8.5.3 VAR-Supplier Business Relationship Value is Strategic and Financial in Nature ....................................................................... 239
8.6 Market, Portfolio, and Functional Focus Determines VAR Type ......... 241
8.7 PLM Vendor Sets a Framework for VAR Value Creation Strategy ...... 244
8.8 VAR’s Business Model is not One-Fit-for-All Model ......................... 245
8.9 VAR’s Value Creation Functions – Demand for Knowledge, Expertise, and Experience ............................................................... 249
8.10 VAR has Wide Diversity of Customer Types ........................................ 252
8.11 Cost Savings, Customer Value Creation, and Competitive Edge are Main Customer Business Goals ..................................................... 255
8.12 VAR Offering is Customer-Type Specific ........................................... 257
8.13 VAR-Customer Business Relationship is Cyclic and Has Lifecycle ............................................................................................... 257
8.14 VAR-Customer Value is Strategic, Financial, and Knowledge in Nature...................................................................................... 259
  8.14.1 VAR-Created Value is Time and Cost Savings through Process and Knowledge Improvements ...................................................... 259
  8.14.2 VAR-Perceived Value Corresponds to Company Performance and Know-How ................................................................. 262
  8.14.3 VAR-Customer Business Relationship Value is Financial and Strategic in Nature ............................................................ 263
8.15 Revised Model of VAR Value Creation in the PLM Systems Context .............................................................................................. 264

9 Discussion ..................................................................................... 269
9.1 Theoretical Implications .................................................................. 269
  9.1.1 PLM Systems Context is Domain-Specific Platform Software Ecosystem .................................................................................. 270
  9.1.2 Context Elements Empower VAR’s Business Opportunities ................................................................. 271
  9.1.3 PLM Vendor Orchestrates, Other Suppliers are Innovative in their Business to Utilize Value Creation Potential ................. 272
9.1.4 VAR is Software Reseller with Service and Product Organization
9.1.5 Customers – Large Variety of PLM Maturities
9.1.6 Customer Business Goals have Emphasis on Operational Benefits
9.1.7 VAR Offering is Mix of PLM Vendor’s Products, VAR’s own Products, and Services
9.1.8 VAR-Supplier Business Relationship is Based on Trust and Cooperation
9.1.9 Supply Network is Network of Networks
9.1.10 Delivery Network is Portfolio of Customer-Specific Networks
9.1.11 Value Creation Strategy is Two-Way Street for PLM Vendor and VAR
9.1.12 Business Model is a Mix of Software Product, Software, and Service Business Models
9.1.13 VAR’s Value Creation Functions are Cooperative and Bidirectional in Nature
9.1.14 Supplier-Perceived Value is Closely Related to Supplier Type
9.1.15 Customer-Perceived Value is Connected to Business Relationship Lifecycle Stage and Number of PLM Cycles

9.2 Managerial Implications
9.2.1 PLM Systems Context Offers Business Potential for Innovators
9.2.2 Innovative Service Product Development
9.2.3 Knowledge Development and Sharing Focused Human Resource Management
9.2.4 A Dynamic VAR Business Model
9.2.5 A Three-Tier Sales and Product Development Organization Structure
9.2.6 A Two-Tier Business Relationship Management Model

10 Conclusions
10.1 Answers to Research Questions
10.2 Reliability and Validity of the Research
10.3 Limitations of the Research
10.4 Suggestions for Further Research
1 Introduction

The software industry is an independent (Hoch et al. 2000), large, and fast growing industry. It has a vital impact on the global economy, but it also has major derivative on other industries (Messerschmitt & Szyperski 2003). Software applications and information systems are important to both private and public sectors and affect almost everyone. (Myers & Avison 2002). Rather than developing software applications themselves, many companies buy software from independent software suppliers. (Hoch et al. 2000, Knowles 1997).

Correct and well-timed product information has an important role in company success (Abramovici & Sieg 2002, CIMdata 2002, Dutta & Wolowicz 2005). The concept of Product Lifecycle Management (PLM) is based on the assumption that every product has its own lifecycle (La Londe 2003). PLM is a function of enterprise systems (Conner 2004, Shang & Seddon 2002). Enterprise systems are based on a common, extensive database that stores the data needed in a company’s daily operations. They offer real-time information to support company’s decision-making. (Davenport 1998).

Like other companies, software suppliers are dependent on their partners and even on their customers during product development and delivery activities (Jansen et al. 2009a, Jansen et al. 2009b). Software suppliers are a part of the software ecosystem, which consists of other software related organizations (Jansen et al. 2009b). Working with a partner gives a software supplier an opportunity to concentrate on its core competencies (Hoch et al. 2000). One type of partner is an intermediary, which role in a marketing channel is to add value (Coughlan et al. 2001, Geersbro & Vedel 2008). The Value Added Reseller (VAR) is one type of an intermediary.

Value is a cornerstone of Business-to-Business (B2B) markets because of the accentuated importance of performance and functionality of products (Anderson & Narus 1998, Anderson & Narus 2004). Value can be viewed from the customer’s perspective, from the supplier’s/seller’s perspective, and from the business relationship perspective.

1.1 Background and Motivation for the Study

When I received a phone call from my colleague at the beginning of 2001, I could not have imagined in my wildest dreams that it was the start of an interesting and challenging PLM journey that would result in this research, which still continues.
At the time I received the phone call, I was working for a global Finnish company as a project manager for operational development projects. I was between projects. My colleague started his phone call by asking, “I have heard that you do not have any projects at the moment.” “Yes, that’s true,” I replied. “Do you know anything about PDM,” he continued. “No,” I replied and I was confused. “Good,” he said. “Do you have time to meet me tomorrow afternoon?” he continued. That was the starting point of my PLM journey.

I knew absolutely nothing about PDM. At that time, PLM was more or less an unknown abbreviation in our company. I ended up becoming a project manager for a project to deploy a PDM system for one of our business units. Our company was centralizing its PDM systems and related business processes and had purchased one of the first real commercial PDM platforms. I completed three PDM deployment projects within two years.

Before the PDM deployment projects, our company had already established close cooperation with a VAR that sold the PDM platform to our company. But it also had established some cooperation with the supplier that had built the platform, although it was a United States based company. After our company finalized the PDM deployment projects, the cooperation with the VAR and the supplier became even deeper because our company started to investigate what PLM might mean in the context of the company and what its potential might be.

Since then, I have had the opportunity to be involved with various PDM/PLM projects, from how to utilize a PLM system in product architecture management, to very basic product data management projects. I have also had an opportunity to work with organizations from various industries and from various geographical locations. These organizations have varied greatly in size with respect to revenue, number of employees, and size of operations.

Although these projects seem to be so different, they all had one thing in common. All of the projects were completed in close cooperation with a VAR, a supplier, or both. While working on these projects, I have had a ringside position to observe the three main actors: suppliers, VARs, and customers. These observations have led me to think about what the real role and business of VARs is in the PLM systems context.

Hoch et al. (2000) argue that although the economics of the software product business is important, the research regarding development of software as a product is still limited. They further state that isolated topics such as the adoption and implementation of software products have been covered, but issues like
integrating corporate strategy, product strategy, and service strategy have not been covered in research.

In addition to my personal experience and observations, the status of the global PLM systems industry has made this subject even more interesting. According to CIMdata (2009), investments in PLM systems are expected to grow in spite of the slowdown of the global economy. In 2008, the forecast for 2009 and 2010 was that growth would be slower than in previous years (CIMdata 2009). CIMdata forecasts that the comprehensive PLM will expand market size to nearly USD $36 billion by 2013. The estimates include both software (license and maintenance) and related services. Much of the growth in 2009 and early 2010 was expected to come from services. (CIMdata 2009). According to CIMdata (2009), a comprehensive PLM covers the full product definition over the entire product lifecycle and across all industries. Leading suppliers are Dassault Systèmes, Oracle, PTC, SAP, and Siemens PLM Software (CIMdata 2009). Still, Ameri & Dutta (2005) argue that Chief Information Officers (CIOs) value other systems, such as data warehousing and content management, over PLM systems.

There are five PLM Mindshare Leader companies that dominate the markets and that all have partner channels. (Przybylinski 2011). The partner channel programs are expected to grow in the future (McFall 2011, Przybylinski 2011). Another interesting characteristic of the PLM systems market is that in addition to traditional industries (aerospace, automotive, electronics, telecom, etc.), new industries (construction, infrastructure, pharmaceutical, Consumer Packaged Goods (CPG), and Food and Beverage (F&B)) are now showing an interest in PLM systems (Przybylinski 2011).

From a scientific perspective, the topic is also interesting. There are studies about software ecosystems (Jansen et al. 2009a, Messerschmitt & Szyperski 2003, Warsta & Seppänen 2007), about software companies (Ali-Yrkkö & Martikainen 2008, Kontio et al. 2005), and about SW business models (Rajala et al. 2003). There are enterprise systems related studies, especially with respect to ERP systems (Davenport 1998, Markus & Tanis 2000) as well as PLM related studies (Abramovic & Sieg 2002, Dutta & Wolowicz 2005, La Londe 2003). There are studies about marketing channels and the role of the intermediary in the channel (Coughlan et al. 2001, Geersbro & Vedel 2008, Weber 2001). But the VAR role in the enterprise systems business, especially in the PLM systems context, is a nearly untouched research area. According to the literature study executed by Sarker et al. (2012) there is no studies, which focus on value cocreation within the B2B context. The fact that partnering with intermediaries is common in
international business (Havila 1993, Havila et al. 2004), in B2B markets (McQuiston 2001), and in the context of packaged software (Sarker et al. 2012) makes the research topic even more interesting, as PLM systems business is very much international, B2B, and packaged software in nature.

1.2 Research Problem and Research Questions

The purpose of the research is to build an empirically grounded model for increasing understanding of value added reseller channels related to enterprise systems businesses, especially focusing on PLM systems businesses. The research question defines the focus of the research and guides the research so data collection is systematic and specific helping to avoid being overwhelmed by a large volume of data (Eisenhardt 1989). The research questions of the research at hand are:

RQ1: Why does a VAR create value for its customers and suppliers in the PLM systems context?

RQ2: How does a VAR create value for its customers and suppliers in the PLM systems context?

The RQ1 is not meant to be a trivial question about the goals of VAR, which answer could be simply to survive in the business. Rather it is interpreted in the research at hand as investigation of the means of the VAR value creation. The scope of the questions is broad. In order to support the documentation and analysis, there is a need to understand the actual value that a VAR creates for its customers and suppliers. Therefore, the main questions require an additional sub-question:

RQ1.1: What is the value a VAR creates for its customers and suppliers in the PLM systems context?

In the PLM systems context, a VAR is an intermediary between its suppliers and customers. The reason for its existence is to create value (Coughlan et al. 2001, Geersbro & Vedel 2008, Weber 2001). The specific character of an intermediary lies in the fact that its role is not a necessity for the business relationship as a whole. The supplier and the customer can always choose to have direct contact with each other, which means taking over some or all of the tasks of the intermediary. (Stern & EL-Ansary 1992). The PLM systems business is an
international business where partnering with intermediaries is common (Havila 1993, Havila et al. 2004). The PLM systems market is B2B where the use of intermediaries like VARs is common (McQuiston 2001).

When thinking about the conflicting arguments about whether or not a VAR’s role in a business relationship between a supplier and a customer is a necessity and given that PLM systems markets are international and B2B in nature and where working with VARs is common, it seems justified to question why a VAR creates value and how it creates value. The PLM systems context also raises the question of whether the value creation has cooperative or coopetitive elements in it.

VAR is a quite common business role but the related research is relatively limited. The scope, which is defined through the preceding research questions and to which the research at hand tries to find answers, is large. The research gap, which is attempted to understand though the research at hand, is the form of the VAR business and its development in process of time. The true research gap will turn out and extend through the empirical analysis of the research.

1.3 Outline of the Research

Chapter 1 is the introduction to this research, presenting the field of research and the research questions that will be answered by the research. The structure of the remainder of the thesis is illustrated in Fig. 1. Chapter 2 reviews the software product classification principles and corresponding software product types. Of special interest is how enterprise systems are categorized. The chapter also provides a definition for enterprise systems and identifies their common characteristics. PLM is one of the main functionalities supported by enterprise systems. First, definitions of PLM systems are discussed. Also, the role of the PLM system among other enterprise systems is discussed. PLM system capabilities and their benefits are identified. A short history of PLM is presented. Also, the implementation challenges of PLM systems are reviewed.

In Chapter 3, the software product business environment is reviewed from the point of view of software ecosystems, software supply networks, and network management. The characteristics of actors in the business environment will then be discussed. The actors are suppliers, intermediaries, consultants, customers, partners, competitors and public bodies. The characteristics, tasks, role in sales channel, role of application service providers, and role of infrastructure service
providers in the software product business environment of intermediaries are reviewed in more detail. Finally, the definition of VAR is aggregated.

Chapter 4 gives an overview of value creation in the software product business. First, the definition of value in general is considered, and customer value, supplier value, and business relationship value is reviewed. Finally, the concepts of value creation and value capture are discussed.

In Chapter 5, a model of VAR value creation in the PLM systems context is built by combining the results from the literature review on enterprise systems theory, SW ecosystems theory, and value creation theory. The model will be used as a tool to collect and analyze the empirical data.

Chapter 6 describes the empirical research approach, design, and process of the study. The qualitative case study as a research method is discussed. The empirical data collection process and the analysis process of the study are described in the chapter.

In Chapter 7, the empirical data from three case companies is analyzed with the help of the priori model of VAR value creation in the PLM systems context that was built in Chapter 5. This chapter presents the results of the within-unit analysis of the case companies examined in this research.

Chapter 8 presents the results of a cross-unit analysis of the different software business actors identified in the priori model of VAR value creation in the PLM systems context. The chapter also presents the revised model of VAR value creation in the PLM systems context based on the analysis of the empirical data presented in Chapter 7 and Chapter 8.

In Chapter 9, theoretical and managerial implications are discussed. In Chapter 10, the research questions asked in the introduction of this research are answered. Additionally, the validity, reliability, and limitations of this research are discussed. Suggestions for future research are given.
Fig. 1. Outline of the research.
2 PLM Systems – an Application Area of Enterprise Systems

Today’s business is global and it operates in a dynamically competitive environment (Cameron 2008). Organizational changes, company mergers and divestments, updates to existing products and services, and introduction of new products and services occur in rapid cycles (Messerschmitt & Szyperski 2003). Companies of all sizes are trying to change their business processes so they are able to change operations to better respond to today’s business requirements. They are looking for computer systems that support this business process change and allow them to more closely integrate their business and operations with that of their partners and their customers (Cameron 2008). At the same time, they expect cost reductions and to possibly strategic business advantages (Cameron 2008, Song et al. 2006). These aspects are required because the ability to rapidly change or introduce new products and services is a competitive advantage in the present business environment (Messerschmitt & Szyperski 2003).

In many business environments, enterprise systems are seen as mandatory to keep and improve a company’s competitiveness (MacKinnon et al. 2008). Enterprise systems are claimed to offer a total, integrated solution to a company’s information processing needs (Markus & Tanis 2000). They are technological systems that also have economic and social effects on the whole company and on its partners if they are integrated with the system (Markus et al. 2000a, Song et al. 2006).

Enterprise systems offer companies the potential to improve their performance. On the other hand, there are disadvantages. They are expensive to purchase, implement, use, and maintain. They also present high risks (Markus et al. 2000a, Rettig 2007), uncertainty, complexity, unexpected change barriers, and hidden errors when a company implements them (Rettig 2007). It may take years before real benefits are apparent in the company’s business and daily operations. There are cases where failure in enterprise system implementation has caused bankruptcy. (Markus & Tanis 2000).

In the 1970s, if a company needed an information system to support its business processes, it designed and programmed the system in-house. If there was something in common with a new system and existing systems, they were loosely integrated with each other. In many cases, this integration was accomplished purely by manual integration. Duplication of data would exist in many different systems. It was an erroneous approach because in many cases, the data in different systems was not exactly the same. (Markus & Tanis 2000).
As of the 1980s, software vendors started to develop integrated software packages as a response to their customers’ demand that they offer one integrated system. These integrated software packages share a common database. Different parts of the software package provide support for various business processes. Gradually, as the functionality of these software packages was enhanced, the packages received new, standardized names like Enterprise Resource Planning (ERP), which supported only financial and human resource business processes, and Material Resource Planning (MRP), which supported manufacturing related business processes. (Markus & Tanis 2000). SAP, PeopleSoft (Markus & Tanis 2000, McGaughey & Gunasekaran 2007), Oracle, and J.D. Edwards are key suppliers in the ERP market (McGaughey & Gunasekaran 2007). Baan is a typical example of an MRP enterprise system product (Markus & Tanis 2000).

Early ERP systems were run on mainframe computers (McGaughey & Gunasekaran 2007). As of the mid-1990s, the ERP vendors started to migrate their systems into client-server architecture (Markus & Tanis 2000, McGaughey & Gunasekaran 2007). This formed a foundation for enterprise systems, which were began to attract larger companies. Before mid-1990’s, it was mostly small and mid-sized companies that were interested in enterprise systems (Markus & Tanis 2000). The client-server architecture offered advantages, such as graphical interface and lower operating costs compared to earlier mainframe architecture (Markus & Tanis 2000). Today, ERP systems vendors have moved, or are moving toward, browser-Web based architecture to allow the addition of e-commerce capabilities to their products (McGaughey & Gunasekaran 2007, Rao 2000, Scheer & Habermann 2000, Siriginidi 2000).

The year 2000 (Y2K) problem drove implementation of enterprise systems in companies (Bagranoff & Brewer 2003, Markus & Tanis 2000). Since then, it has become more difficult to get approval for this type of expensive investment. It is easier to identify the cost of enterprise system implementation than its benefits. In addition to software purchases and licensing costs, other costs exist, such as data conversion, testing, configuration and customization, training, etc. Enterprise system implementation benefits are hard to quantify. How does one calculate or apply a value to improved decision-making capability? Or how do you value greater customer satisfaction or organizational flexibility gained through system integration? (Bagranoff & Brewer 2003).
An enterprise system may be a result of long and expensive development effort. They might be the result of in-house development that has used an existing application, like a departmental application, as a basis. This so-called legacy system has been modified; some new parts might have been added into it to further automate the company’s business processes. Some companies have taken another approach. They have purchased an enterprise system from a vendor. This type of enterprise systems must be flexible in order to meet different and rapidly changing business needs of various companies. Flexibility can be built using solution modularity or by adding configuration options into the solution to allow customization (Messerschmitt & Szyperski 2003). For example, the SAP R/3 solution has more than 5000 different configuration parameters (Scheer & Habermann 2000).

This chapter provides an overview of enterprise systems through enterprise systems literature. The first section discusses how enterprise systems are categorized among software products (Section 2.1). The second section formulates the definition for enterprise systems (Section 2.2). After that, the typical characteristics of enterprise systems are listed (Section 2.3). The last section gives an overview of PLM systems (Section 2.4).

2.1 Software as a Product – Software Product

Hoch et al. (2000: 27) have segmented the IT markets into four segments, where the software products and services segment represents the software industry. They argue that their segmentation mirrors evolution of the software industry. They draw a line between service business and software product business. Product software is defined as “a packaged configuration of software components or a software-based service, with auxiliary materials, which is released for and traded in a specific market” (Xu & Brinkkemper 2005: 525, Xu & Brinkkemper 2007: 534). Auxiliary material refers to software documentation.

Professional software services are customer-specific projects that develop software products based on the needs of one or, at maximum, a few customers. Customer-specific software products require no or a minimum amount of productization. The number of sales units is also low. (Hoch et al. 2000). The word ‘productization’ does not officially exist in the English language but is commonly used in the literature, especially in the context of the service and software industry. (Simula et al. 2008). Productization is a term closely connected to mass customization and commercialization. Mass customization is more related
to manufacturing and product cost management. Commercialization includes activities that are needed for introducing a new technology into a market. In general the term productization consists of activities that make a firm’s product offering that maximizes the customer benefits and make sure that the firm’s goals are achieved. (Simula et al. 2008).

In the software products segment, the segmentation principles of Hoch et al. (2000) refer to the degree of productization and unit sales. Packaged mass-market software products are complete, ready to use solutions. They do not need any additional installation service. So their productization need is low, but the unit sales are high. Microsoft Windows 95 is an example of a packaged mass-market product. Enterprise solutions software products almost always need some degree of customization. The time to get them up and running is considerably longer compared to packaged mass-market software products. (Hoch et al. 2000).

Xu & Brinkkemper (2007: 532) classify software according to what is sold and how much. They differentiate between software and appliance, where appliance is embedded software. If it is sold once, it is a micro-program. If it is sold many times, it is embedded software. Software can be either tailor-made software or product software. Tailor-made software is characterized as customer-specific and developed either in-house or under contract (Iberle 2003). Product software can be either a business-to-business product software or business-to-consumer product software (Xu & Brinkkemper 2007). These two software product types are targeted to separate customer segments; the first one to business customers and the last one to individual buyers (Iberle 2003).

Both Xu & Brinkkemper (2005, 2007) present a list of product software types. Commercial software is a software “which is purchased through the retail market and must be licensed before usage.” Packaged software is ready-made software that can be purchased from a software vendor, but generally requires a little modification or customization. Examples of this type of software product are ERP and Customer Relationship Management (CRM) systems, which are rarely ready-to-run. Shrink-wrapped software is software on media that is boxed, shrink-wrapped, and sold in stores or downloaded from the Web. Standard software, like business applications and operating systems, is routinely installed on most computers within certain organizations. Commercial off-the-shelf software is developed for a whole market and used as is, or moderately personalized without changing its original functionality. The authors argue in favour of both open
source software and Application Service Provisioning (ASP) as categories of product software.

Xu & Brinkkemper (2007) also categorize software products based on software development style and the moment the vendor and customer complete their business transaction. The first category is semi-finished software products, which could be sold or licensed to other business partners. The second category is self-install software products, which are distributed by vendors and can be installed by customers without special help. The third category includes software products that require professional help and may even require organizational changes.

Table 1 summarizes the preceding software product classifications and classification principles. All authors (Hoch et al. 2000, Xu & Brinkkemper 2005, Xu & Brinkkemper 2007) use number of sales units as the classification principle. The degree of productization, software development style, and “make one, sell many” as classification principles reflects the goal for developing a software product that is ready to use as much as possible or that only needs some minor degree of customization. The classifications of different sources are partly overlapping. In the research at hand we do not do any synthesis between them, because we only want to find appropriate category for enterprise systems.
Table 1. Examples of software product classification principles and corresponding software product types.

<table>
<thead>
<tr>
<th>Author</th>
<th>Classification Principle</th>
<th>Type</th>
<th>Typical Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoch et al. (2000)</td>
<td>Degree of productization Unit sales</td>
<td>Packaged mass-market software Enterprise solution</td>
<td>Complete, ready to use solution Need for some degree of customization</td>
</tr>
<tr>
<td>Xu &amp; Brinkkemper (2005, 2007)</td>
<td>Make one, sell many</td>
<td>Commercial software Packaged software Shrink-wrapped software Standard software Commercial off-the-shelf</td>
<td>Purchased through the retail market and licensed before usage. A ready-made software product purchased from a software vendor, but which generally requires a little modification or customization. Software on media that is boxed, shrink-wrapped, and sold in stores or downloaded from the Web. Routinely installed on most computers within certain organizations. Developed for a whole market and used as is, or moderately personalized without changing its original functionality.</td>
</tr>
</tbody>
</table>
Hoch et al. (2000) use the term software product. In the same context, Xu & Brinkkemper (2005, 2007) use the terms software product and product software interchangeably. The research at hand uses the term software product.

The preceding discussion is recapped as follows. Software products are complete solutions. The unit sales, degree of readiness, and use of sales channel depends on the market to which they are targeted. If they are targeted to individual buyers, they are easy to install, they do not need any additional customization, their unit sales are high, and the commonly used sales channel is retail. If they are targeted to business customers, they need professional installation, modification, customization, and deployment help. The unit sales are lower than software products targeted to business-to-customer markets.

Depending on which classification is used, enterprise systems are categorized as a software business category of its own (Hoch et al. 2000: 27) or part of a more general category, such as business-to-business product software (Xu & Brinkkemper 2007), professional-deploy software (Xu & Brinkkemper 2007), or packaged software (Xu & Brinkkemper 2005, Xu & Brinkkemper 2007). As enterprise solutions and especially PLM solutions are within the scope of the research at hand, the next section covers the definition of enterprise systems in general.

2.2 Definition of Enterprise Systems

There are several terms within the literature that refer to the same concept when talking about enterprise systems: enterprise system (Davenport 1998), enterprise computer system (Shehory 2006), and enterprise application (Conner 2004). Several authors use terms like enterprise system or enterprise application when they only refer to ERP systems (Gable 2002, MacKinnon et al. 2008).

Also, there are several definitions for enterprise systems within the literature. The definition offered by Shehory (2006: 1531) is simple: “The goal of an enterprise computer system is to provide the enterprise with services of data processing, data communication and data storage.” The definition offered by Shang & Seddon (2002) is condensed: “Enterprise systems (ES) are large-scale organizational systems built around packaged enterprise system software.”

According to Song et al. (2006: 4059), “information system serves people who work with data, helping enterprises detect, organize and integrate new information and knowledge, coordinating information transfer within enterprises or between enterprises and the outside to ensure smooth information flow.” They
further note that the effect of the information system at the knowledge level is reflected in helping people who work with knowledge and data to manage and refine useful information and knowledge.

The preceding definitions highlight the data processing, storage, and information transferral capabilities of enterprise systems. Markus & Tanis (2000: 179) include value added and reduction of duplicated work in their definition. Their definition of enterprise system is as follows: “The organizational infrastructure that will support future value-generating applications, such as linking the organization’s operations with those of suppliers and customers, leading to substantial reductions in duplicated activities across firms.”

McGaughey & Gunasekaran (2007) have a similar definition of an ERP system. An ERP system is an application area of enterprise systems. They combine value creation, information, and business processes in their definition: “The ERP system is an information system that integrates business processes, with the aim of creating value and reducing cost by making the right information available to the right people at the right time to help them make good decisions in managing resources productively and proactively” (McGaughey & Gunasekaran 2007: 24).

The definition by Holland & Light (1999) is in line with the definition of McGaughey & Gunasekaran, but they highlight automation of the corporate process activities.

The definition of Messerschmitt & Szyperski (2003: 41) for a software application is as follows: “A software application is a set of functionalities and capabilities (also called features) that forms a cohesive whole, has integrating qualities (e.g., a common security model), and targets a characteristics domain of human activity.” Enterprise systems are transaction-processing applications: “They are commercial software packages which enable the integration of transactions-oriented data and business processes throughout an organization (and perhaps eventually throughout the entire inter organizational supply chain).” (Markus & Tanis 2000: 176). For example, the definition of ERP by Scheer & Habermann (2000: 58) is in line with the preceding definition, although it is more practical in nature: “ERP systems are instruments for improving business processes such as manufacturing, purchasing, or distribution.” Shang & Seddon (2002) give a condensed definition of enterprise systems, “Enterprise systems (ES) are large-scale organizational systems built around packaged enterprise system software.”
Enterprise systems can also be seen as Complex Product Systems (CoPS) that are “any high cost, engineering-intensive product, sub-system, system or construct supplied by a unit of production (be it a single firm, a production unit, a group of firms or a temporary project-based organisation)” (Hobday 1998). These systems are made up of various types of components, such as semiconductor devices or software packages. They are hierarchically organized to perform a common goal, e.g. an aircraft or a business information system. (Hobday et al. 2006).

The research at hand combines the definitions of the preceding authors. The definition for enterprise systems is that enterprise systems are large-scale organizational systems that support future value-generation, leading to substantial reductions in duplicated activities across firms. They are built around commercial, packaged software, which enables the integration of business data and business processes throughout the organization and between organizations.

The definition highlights the enterprise systems nature of adding value to the companies implementing them and their capability of integrating business processes to corresponding data using the systems. The definition also points out the organizational linkage effect of enterprise systems and the possibility for gaining cost reductions by reducing the amount of duplicated activities within the organization that implements such systems. The definition is consistent with the view of Hoch et al. (2000) and Knowles (1997) by saying that enterprise systems are commercial software packages. In this context, commercial means that the systems are purchased from specialized software vendors and are not developed in-house (Markus & Tanis 2000).

The preceding definitions highlight the transaction management characteristics of an enterprise system. Because the scope of the research at hand is PLM systems and their functionality is related to product development and design, we argue that PLM is related more to information and knowledge management than the transaction type of data management. That is why the transaction data management is ignored in the definition of enterprise systems, although in general, it is a notable capability of other enterprise system functions, especially the enterprise resource planning function.

Researchers have slightly conflicting views about the main functionality of enterprise systems. In any case, enterprise systems support complete business processes (Messerschmitt & Szyperski 2003). They integrate the data used throughout the entire organization (Davenport 1998). Main functionalities are financials, human resources, operations and logistics, sales and marketing
(Davenport 1998), Records Management/Archiving (Gable 2002), E-commerce, data warehousing, business intelligence, and reporting (Klaus et al. 2000). The functionality list of Shang & Seddon (2002) is simple. The main functionalities are ERP, CRM, Supply Chain Management (SCM), PLM and eProcurement. In some cases, an ERP system can even include other enterprise system application areas, such as a CRM system or Supplier Relationship Management (SRM) system (McGaughey & Gunasekaran 2007). McGaughey & Gunasekaran (2007) and Klaus et al. (2000) both have a more extensive list of functionalities, including data, knowledge and business information warehouse, business intelligence, analytics and reporting, data mining, E-commerce, and sales in addition to the previously mentioned functionalities. Conner (2004) adds PLM to the list offered by Davenport (1998) as one supported function of enterprise systems. According to Nordheim & Päävärinta (2006), data warehouse systems and Electronic Content Management (ECM) systems also fulfil the criteria of enterprise system.

The research at hand uses the definition of Shang & Seddon (2002) to refer to the main functionalities supported by enterprise systems. The functionalities are ERP, SCM, CRM, eProcurement, and PLM. Table 2 aggregates the preceding lists of enterprise system functions and their sub-functions. Inside the enterprise systems functions, the PLM function is positioned to present product development and design (Conner 2004). PLM is within the scope of research at hand.

Table 2. Enterprise systems functions assessed by individual authors.

<table>
<thead>
<tr>
<th>Author</th>
<th>Enterprise Systems</th>
<th>Main Functions</th>
<th>Sub Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturing, delivery and support (ERP)</td>
<td></td>
<td>Online customer configuration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rapid proposal response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manufacturing collaboration:</td>
<td>Engineering change management coordination</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Just-in-time customization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Design for manufacturing and service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aftermarket product information</td>
</tr>
<tr>
<td>Author</td>
<td>Enterprise Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Main Functions</td>
<td>Sub Functions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply chain (SCM)</td>
<td>Supplier collaboration:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joint development</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outsourced design</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contract manufacturing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Product design and development (PLM)</td>
<td>Product/Service development collaboration:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product portfolio management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product data, configuration, and document management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product requirements management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project and program management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collaborative design and visualization</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collaborative direct material sourcing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Davenport (1998)</td>
<td>Financials</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accounts receivable and payable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asset accounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cash management and forecasting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost-element and cost-centre accounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Executive information system</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Financial consolidation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>General ledger</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product-cost accounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Profitability analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Profit-centre accounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard and period-related costing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human resources</td>
<td>Human-resources time accounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Payroll</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personnel planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Travel expenses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operations and logistics</td>
<td>Inventory management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Material requirements planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Materials management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plant maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchasing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Routing management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shipping</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vendor evaluation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales and marketing</td>
<td>Order management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pricing Sales management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sales planning</td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>Main Functions</td>
<td>Sub Functions</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Order entry</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>General ledger</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchasing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warehousing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transportation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Human resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer Relationship Management (CRM)</td>
<td>Management and control of interaction between a company and its clients</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer order tracking</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer account management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human resource management</td>
<td>Performance appraisal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Payroll</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Benefits enrolment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skills inventory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accounting</td>
<td>Income and expense management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Records</td>
<td>Storing, accessing, managing, and viewing of data that is print-stream oriented.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management/Archiving</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer relationship Management (CRM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply Chain</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management (SCM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Product Lifecycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management (PLM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>eProcurement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enterprise systems are complex social and technological systems that integrate technology, organizations, management, human capital, etc. They also affect clients and suppliers of the company implementing the systems. (Song et al. 2006). As enterprise systems partly share common functionality, they also have certain common characteristics.
2.3 Common Characteristics of Enterprise Systems

Enterprise systems share certain common characteristics. They are modular (Davenport 1998, Markus et al. 2000a). They need system configuration during the implementation phase. They must be integrated with existing IT infrastructure. They are commercial software packages. They support generic business processes. They are evolving. They integrate a significant amount of information. (Markus & Tanis 2000).

Most enterprise systems are modular. Some definitions of enterprise systems highlight their modular nature, such as the definition put forth by Clemmons & Simon (2001: 207): “Enterprise Resource Planning (ERP) system is business software, which is multifunctional in scope, integrated in natural, and modular in structure.” Modularity gives companies the option of gradually implementing the system (Davenport 1998). Integrated system architecture is an enabler for system modularity (Shang & Seddon 2002). A company can choose only those modules from the whole enterprise system that provide the best possible support to the company’s operations (Markus & Tanis 2000) and that create an engine for integrating data, processes, and information technology in real time internally and across the company’s value chains (Shang & Seddon 2002). Selected modules are installed and their software parameters are set according to the company business model. After that, the system is brought into use. (Markus & Tanis 2000).

Configuration means setting software parameters to alter the functionality of existing software (Markus & Tanis 2000). It is not programming, which means creating new functionality (Markus & Tanis 2000) or extending existing functionality. Setting software parameters of an enterprise system is called system configuration (Markus & Tanis 2000). Shang & Seddon (2000) use the term semi-finished product when talking about enterprise systems because according to them, enterprise systems contain tables and parameters that can be used to adjust the system according to business needs.

Installation of the selected modules of the enterprise system is only one part of the installation work. The system has its own hardware, operating system, database management system, and telecommunication system requirements, which should be integrated into the company’s existing IT infrastructure. In some cases, a company may want to integrate its own proprietary legacy system with the new enterprise system. (Markus & Tanis 2000). Legacy systems are implications of existing business processes, organization structure, culture, and information technology (Holland & Light 1999).
Software vendors create their enterprise systems to support common, global business processes (Markus & Tanis 2000, Scott & Vessey 2002). Generic business processes are a vendor’s view of best practices of business processes, determined through an analysis of academic theory, inputs from many different businesses (Markus & Tanis 2000), and knowledge collected from a wide range of successful client company implementations (Shang & Seddon 2002). Vendors make a series of assumptions about how companies should operate in general (Arif et al. 2005, Davenport 1998). These assumptions may or may not correspond to the customer’s assumptions of best practices (Davenport 1998). Software vendors and consultant companies can use process reference models to provide information about the best practices embedded into the enterprise system (Scheer & Habermann 2000).

Enterprise systems are evolving. New functionality is added regularly. Originally, enterprise systems had modules for supporting a company’s financial operations and to some extent a company’s manufacturing resource planning. Gradually, software vendors have added modules that support sales management, supply chain management, and customer relationship management. (Markus & Tanis 2000).

Enterprise system architecture changes according to development of IT technology. The first enterprise systems were based on mainframe architecture. The server/client architecture implementation was the first big system-architecture level of change in enterprise systems. Technology has evolved and today software vendors have Web-enabled versions of their software products. (Markus & Tanis 2000). Service-Oriented Architecture (SOA) is waiting for its turn because it is still in the early stages of development. There are still many problems to be solved before it can be used as a backbone for a new architecture. SOA enables the building of modular cross-system business processes that adopt parts of functionality from multiple different enterprise systems to complete the set of tasks. It will ease changes to business processes. (Rettig 2007).

Enterprise system service offering is evolving. For example, there are companies that offer enterprise system functionality on an outsourced basis (Markus & Tanis 2000). ASPs purchase applications and licenses and use these assets to operate as a service to other companies. Infrastructure Service Providers (ISP) purchase hardware and software infrastructure, operate them, and offer them as a service to other companies. (Messerschmitt & Szyperski 2003).
As a summary, enterprise information systems have certain characteristics, which all have an impact on the organizations that implement them. They are commercial software packages that are purchased from a software developer, not done in-house. They integrate company information, hardware, operating systems, database management system software, telecommunication systems, and legacy systems as needed to customize the enterprise system so that it is suitable given the company size, structure, and geographical distribution.

According to the definitions of Shang & Seddon (2002) ERP, CRM, SCM, PLM and eProcurement software are the functionalities that are supported by enterprise systems. As PLM systems are the scope of the research at hand, the next section will take a close look at these systems and their history.

2.4 PLM Systems

The PLM concept assumes that every product has a lifecycle (La Londe 2003) with many engineering stages in addition to other stages (e.g., manufacturing, sales, maintenance, and recycle or destroy (Ma & Fuh 2008). According to Ma & Fuh (2008: 107) “PLM has been more broadly used as a technical term to describe a comprehensive, systematic and scientific approach in managing enterprise performance based on a coherently and consistently integrated computer system that can effectively and efficiently fulfil the product and process information requirements within a dynamic, collaborative and networked environment.” Investment in PLM systems increased during 2008 despite the global economic downturn (CIMdata 2009). Automotive and aerospace industries have widely implemented PLM systems. Growth of the PLM business is expected to come from consumer-product industry businesses, such as food and beverage, pharmaceutical, and apparel manufacturing. (Bacheldor 2004, CIMdata 2009).

PLM is a functional extension of Product Data Management (PDM), although several acronyms can be found in the literature that are all covered by the definition of PLM: collaborative product development, collaborative product commerce, 3D product lifecycle management, product knowledge management, or virtual product development (Abramovic & Sieg 2002, CIMdata 2002).

CIMdata defines PLM as “a strategic business approach that applies a consistent set of business solutions in support of the collaborative creation, management, dissemination, and use of product definition information across an extended enterprise from concept to end of life – integrating people, process, business systems, and information” (CIMdata 2003: 5). From a technological point
of view, PLM systems are “distributed technological information systems for archiving, administrating and providing all product or facility related information in required quality and at the right time and place” (Abramovici & Sieg 2002).

The preceding definitions of PLM have common elements. They highlight the important role of correct and well-timed product information for achieving company success. Other authors like Dutta & Wolowicz (2005) share the same view. PLM is a process that manages the product lifecycle (Dutta & Wolowicz 2005). Definitions by Abramovici & Sieg (2002) and Ma & Fuh (2008) share the view that PLM systems are integrated information systems. The definitions also highlight the importance of collaboration in a networked business environment (CIMdata 2003, Ma & Fuh 2008). Also, integration of people, process, business systems, and information have leading roles in these definitions (CIMdata 2003, Ma & Fuh 2008). CIMdata (2003) sees PLM as a strategic business approach that is consistent with the views of other authors like Anonymous (2007) and Dutta & Wolowicz (2005).

The research at hand combines the definitions of CIMdata (2003: 5) and Dutta & Wolowicz (2005) because they define PLM as a strategic business approach and as a process, they highlight the PLM nature as being integrative and collaborative, and they state the importance of product information management from concept to end-of-life point of a product for a company’s success.

Depending on the definition, the product lifecycle can start from the design stage (La Londe 2003) or even earlier, from concept development (Abramovici & Sieg 2002). The last stage is disposal (Abramovici & Sieg 2002, La Londe 2003). Between these two ends of the product lifecycle, there are stages or phases of manufacturing (La Londe 2003), delivery (Abramovici & Sieg 2002), service (La Londe 2003), and maintenance (Abramovici & Sieg 2002). Researchers have named the lifecycle stages differently, but the content of the stages is almost the same.

2.4.1 PLM Capabilities

Conner (2004) and Dutta & Wolowicz (2005) share the view that the role of PLM systems among other enterprise systems is between the internal operations (ERP), supply chain management (SCM), and customer relationship management (CRM). Ameri & Dutta (2005) indicate that instead of the PLM system being a peer among other enterprise applications, it is a foundation on which other applications
can operate in a more integrated fashion. PLM systems are responsible for product design and development (Conner 2004). The research at hand takes the view that a PLM system is a foundation on which other enterprise systems can operate in an integrated way (see Fig. 2).

**Fig. 2. The role of PLM system among other enterprise systems.**

The capabilities supported by the PLM systems are closely reviewed because PLM systems are the scope of the research at hand. Capabilities of the PLM systems are product data (Conner 2004, O'Marah 2003) and configuration management, document management (Conner 2004), product portfolio management (Conner 2004), product idea (Schuh et al. 2008) and requirements management, project and program management, collaborative design and visualization, collaborative direct material sourcing (Conner 2004), engineering change management, and electronic bill of materials management (O'Marah 2003). Some authors also include capabilities such as product environmental impact analysis and total lifecycle costing (Schuh et al. 2008). Engineering change management is seen as one of the key capabilities of PLM systems because it speeds up the lead-time of a change by shortening the time needed for identifying and resolving a quality problem and it automates communication between the company and its manufacturing partners and suppliers. (Conner 2004, O'Marah 2003).

The PLM element definition of Schuh et al. (2008) closes the product lifecycle information loop, i.e., information management starts with product idea
management and ends with service and maintenance data reuse in product development. Their definition also covers product environmental impact analysis, which includes issues like product energy efficiency and material recycling. Total lifecycle costing is also covered in their PLM element definition.

The PLM capabilities are identified as the result of literature review (Conner 2004, O’Marah 2003, Schuh et al. 2008). The number of the capability categories has been tried to keep at the reasonable level. To do so prior literature (Abramovici & Sieg 2002, Dutta & Wolowicz 2005, Malykhina 2005) has been used to logically combine the categories and enrich their content. Following sections provide a detailed overview to some capabilities supported by the PLM systems.

**Product Data and Configuration Management**

Product data management forms a foundational layer for enterprise-wide product information management. It ensures that every user is using the same, current version of product data (Conner 2004, Malykhina 2005). Dutta & Wolowicz (2005) use the definition of ability to create, share, and collaborate when talking about storing and distributing product related data. It has been created using many different tools and it comes from many different internal and external sources.

Abramovici & Sieg (2002) point out that in general, PLM systems work with digital files and database records when managing product configurations, part definitions, and design data (e.g., specifications and Computer Aided Design (CAD) drawings, among other things). The objects in product structure represent the lifecycle information of a product (Schuh et al. 2008).

**Product Portfolio and Product Management**

A product portfolio is a collection of products. Portfolio management is responsible for monitoring and managing portfolio profitability. (Dutta & Wolowicz 2005). It maintains the product mix of the portfolio to make sure that a company’s product offering to its customers is the best possible, meets strategic objectives, and demonstrates industry leadership (Conner 2004, Dutta & Wolowicz 2005, O’Marah 2003).

As product portfolio management monitors the collection of products, product management monitors profitability of individual products (Dutta &
Product Idea and Requirements Management

In general, PLM systems have requirements management capability. It links the captured market requirements with the company’s product development process. (Conner 2004, O’Marah 2003). It also covers requirement traceability over the whole product lifecycle (Schuh et al. 2008). Change impact analysis (Schuh et al. 2008) and change management are also essential parts of requirements management (Conner 2004). The importance of requirements management has grown, since product development activities are spread over the extended supply chain (Schuh et al. 2008).

Program and Project Management

Program and project management is responsible for project goal, task, and issue management (Conner 2004). It tracks project progress (Conner 2004, Malykhina 2005) to assure product development targets are met (Dutta & Wolowicz 2005). Postponed product release or launch dates may have a significant effect on product profitability, especially when talking about products that have a short lifecycle, like electronics (Dutta & Wolowicz 2005). Project management belongs to the classic PDM function, but according to the research of Schuh et al. (2008), its capability of fulfilling user expectations is limited. They suppose that widespread usage of stand-alone project management systems, like MS Project, has had an effect on this result.

Collaborative Design and Visualization

Collaborative design and visualization gives the ability to interact with internal and external design and manufacturing partners. PLM systems integrate engineering information with manufacturing information. All development participants receive appropriate input on their product design, development, and design change work. (Conner 2004, O’Marah 2003).
Engineering Change Management

Engineering change functionality speeds up the lead-time of the change by shortening the time needed for the identification and resolution of quality problems that may be an issue. Electronic engineering change automates communication between a company and its manufacturing partners and suppliers. Engineering change is afterward automatically traceable. (Conner 2004, O'Marah 2003).

Collaborative Material Sourcing

Effective supplier communication is important when a company is making cost reduction types of changes to its existing product to improve the product’s profitability. Supplier selection and management is also part of the PLM functionality. (Conner 2004, O'Marah 2003).

Summary

PLM systems are in the scope of the research at hand. PLM is one of main functionalities of the Enterprise Systems (ES). As earlier stated in the research at hand (see Section 2.4.1) the PLM systems are an enterprise system type among the other enterprise systems. Respectively we define PLM systems as large-scale organizational systems that support future value-generation, leading to substantial reductions in duplicated activities across firms. They are built around commercial, packaged software, which enables the integration of business data and business processes throughout the organization and between organizations. They are targeted at B2B customers. The PLM systems capability list of Conner (2004), O’Marah (2003) and Schuh et al. (2008) has been merged and is presented in Fig. 3.
2.4.2 Benefits of PLM Systems

Through PLM system implementation, a company can gain benefits in the areas of IT infrastructure, business process improvements, data quality and visibility, and business performance. PLM systems, like other integrated enterprise systems, improve a company’s IT architecture (O’Marah 2003) and remove technology capacity constraints (Markus & Tanis 2000, Scott & Vessey 2002). They improve IT platform efficiency and reliability (Ross & Vitale 2000) and decrease computer operating (Markus & Tanis 2000) and maintenance costs (Davenport 1998, Ross & Vitale 2000). They also decrease software maintenance costs because software vendors do part of the maintenance work of commercial enterprise systems. In some cases, even third parties can complete software maintenance. (Markus & Tanis 2000). One source of IT costs is system integration. Replacement of a company’s legacy system with an integrated enterprise system simplifies the system integration network and reduces corresponding maintenance costs. (Ross & Vitale 2000).

In general, senior management and enterprise owners are the initiators and supporters of enterprise system implementation. They are interested in the benefits an enterprise system brings to the company at the operational, managerial, strategic, and organizational levels. At the operational level, they expect to see cost savings, including IT cost savings, a shortened turnover time, and improved productivity and service quality. Cost savings are achieved by improving the efficiency of routine activities, such as stock management and various types of calculations. Management level interest is in the optimized use of company resources. At the strategic level, the main interest is in how the system supports the expansion of a company’s business and new business models, such as e-
commerce. Initiators and supporters are also interested in systems impact at the organizational level (i.e., employee retraining and need for new skills). (Song et al. 2006).

PLM is a function of enterprise systems. In general, it shares the same benefits as other enterprise systems. Ross & Vitale (2000) have modelled motivations for implementing enterprise systems in the context of ERP systems implementation. They have identified infrastructure, capability, and performance level motivations. At the infrastructure level, an enterprise system forms a common IT infrastructure platform for a company and is an enabler for capability-level motivations. They have recognized process improvements and data visibility as capability level motivations, which can be converted to company performance output.

Different types of benefits are realized in different situations and at different points in time. Different stakeholders perceive them differently. (Shang & Seddon 2004). Financial payoffs may be hard to verify (Markus et al. 2000b, Markus & Tanis 2000). Benefits can be evaluated at operational, managerial, strategic, IT infrastructure, and organizational levels (Shang & Seddon 2002). It might take more than a year for users to learn to effectively run their operational systems. Managers have to learn to trust new system reporting capabilities before any managerial benefits are visible. Organizational benefits become apparent once organizational resistance eases, which may take two years or more. In some cases, certain benefits are achievable only after another benefit has been realized. For example, managerial benefits are often achievable only after operational level activities produce data that is considered correct and reliable. (Shang & Seddon 2004). Table 3 aggregates enterprise system benefit dimensions, definitions, types, and stakeholders.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Definition</th>
<th>Type</th>
<th>Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational benefits</td>
<td>Operational activities and day-to-day process activities that involve acquisition and consumption of resources and are repeated periodically (daily, weekly, and monthly).</td>
<td>Cost reduction, Cycle time reduction, Productivity improvement, Quality improvement, Customer service improvement</td>
<td>Business managers who know about business value chain processes, and business stakeholder support activities.</td>
</tr>
<tr>
<td>Managerial benefits</td>
<td>Business management activities involve allocation and control of the firm’s resources, monitoring operations and supporting strategic business decisions. These activities usually rely on summarized information or exception reports.</td>
<td>Better resource management, Improved decision-making, and planning, Performance improvement</td>
<td>Business managers who know about the different kinds of resources affected and different levels of decision-making.</td>
</tr>
<tr>
<td>Strategic benefits</td>
<td>Strategic activities involve long-range planning regarding high-level decisions, such as business merging and acquisition, marketing competition, product planning, customer retention and capital sourcing.</td>
<td>Support for business growth, Support for business alliance, Building business innovations, Building cost leadership, Generating product differentiation, Building external linkages</td>
<td>Senior managers who know about achievement of the various strategic goals.</td>
</tr>
<tr>
<td>IT infrastructure benefits</td>
<td>IT infrastructure consists of sharable and reusable IT resources that provide a foundation for present and future business applications.</td>
<td>Building business flexibility for current and future changes, IT cost reduction, Increased IT infrastructure capability</td>
<td>IT managers who know about IT cost items and different types of business and technology changes.</td>
</tr>
<tr>
<td>Organizational benefits</td>
<td>Organizational benefits arise when the use of an ES benefits an organization in terms of focus, cohesion, learning and execution of its chosen strategies.</td>
<td>Changing work patterns, Facilitating organizational learning, Empowerment, Building common vision, Increased employee morale and satisfaction, Greater employee accountability, Transformation of users from doers to planners with broadened skills</td>
<td>Business managers who know about individual attitudes and interpersonal interactions.</td>
</tr>
</tbody>
</table>
The following sections use the classification of ERP implementation motivations of Ross & Vitale (2000) to discuss in more detail why companies become motivated to implement PLM systems and what benefits are achievable.

**IT Infrastructure - Common IT Platform and Cost Savings**

A common IT platform creates new business capabilities for a company. When a company decides to invest in its IT infrastructure, there are both business and technical reasons that act as decision drivers. Business benefits like cost savings in IT operations and maintenance are evident motivations and goals for IT infrastructure renewal. IT infrastructure benefits come from the ability to respond to internal and external changes quickly at a low cost from overall IT cost reductions such as legacy system shutdowns and easy adaptability of modern technology. (Shang & Seddon 2000). In the enterprise system benefit framework of Shang & Seddon (2002) IT infrastructure is a benefit dimension of its own (see Table 3).

The Y2K problem was a technical problem that was solved by replacing existing systems with enterprise systems (Bagranoff & Brewer 2003, Ross & Vitale 2000). The root cause for the Y2K problem was that programs had represented the year using only two digits. For example, the year 1989 was represented by ‘89’ in program code and databases. After the year 2000, it was impossible to know whether ‘89’ stood for the year 1989 or the year 2089. Companies needed to make a choice between paying money to fix the Y2K problem in their existing systems, or to replace them with a new system that did not have the Y2K problem (Bagranoff & Brewer 2003). Many companies selected the latter alternative (Markus & Tanis 2000).

According to the research of Ross & Vitale (2000), it seems that more companies want to replace existing IT infrastructure, which in many cases is a collection of aging technology legacy systems. Integrated enterprise systems improve a company’s IT architecture and reduce costs caused by fragmented IT system architecture and manual collaboration (O’Marah 2003), and removes technology capacity constraints (Markus & Tanis 2000, Scott & Vessey 2002). By removing technical and technological barriers, companies expect to secure IT support for their future business growth (Markus & Tanis 2000).

An IT platform based on multiple systems is inefficient and unreliable (Ross & Vitale 2000). Integrated enterprise systems decrease computer operating
(Markus & Tanis 2000) and maintenance costs (Davenport 1998, Ross & Vitale 2000). Especially in large enterprises or in companies with a complex organizational structure, integrated information systems consolidate multiple systems of the same type. Software vendors may be partly responsible for the software maintenance of commercial enterprise systems. It is also possible to use third parties to take over the maintenance work. (Markus & Tanis 2000).

Over time, business requirements change. Originally, stand-alone legacy systems might have been gradually integrated into one another to form a legacy system network. Adding a new system to this system network is time-consuming work (Markus & Tanis 2000, Ross & Vitale 2000). Even testing a new integration might take months (Ross & Vitale 2000). When an integrated enterprise system replaces a company’s legacy system (Ross & Vitale 2000), it simplifies the system network by removing integrations.

If a company has a merger and acquisition growth strategy, it may face problems when integrating IT systems of an acquired company into its own systems (Markus & Tanis 2000, Ross & Vitale 2000). Although enterprise systems are integrated software packages, their integration capabilities might be limited or do not fulfill all requirements of a company’s IT integration architecture or strategy (Markus & Tanis 2000). A common IT platform generates both business process improvements and data visibility capabilities (Ross & Vitale 2000), which will be discussed in the following sections.

**Business Process Improvements**

Companies expect to improve and standardize their inefficient and informal business processes through the adoption and use of an enterprise system (Markus & Tanis 2000, Ross & Vitale 2000). In some cases, those business process improvements are focused on certain business processes, such as logistics, production, or customer service (Ross & Vitale 2000). In other cases, companies standardize business processes and procedures throughout the company and simultaneously reduce the autonomy of various business units (Davenport 1998, Markus & Tanis 2000). In the enterprise system benefit framework of Shang & Seddon (2002), business process improvements create benefits that belong to managerial, strategic, and organizational benefit dimensions (see Table 3).

Software vendors are trying to create generalized processes in their enterprise systems to fulfill as many business needs as possible (Markus & Tanis 2000). Authors have conflicting views about the benefits of business process
improvements. Some authors view enterprise systems, like PLM systems, as enablers for business process improvements because they allow process standardization (Markus & Tanis 2000, Ross & Vitale 2000) and reduction of the autonomy of various business units (Davenport 1998, Markus & Tanis 2000). Some authors argue that enterprise systems impact a company’s flexibility, behaving as enablers for outsourcing and other non-traditional work arrangements (MacKinnon et al. 2008). Enterprise systems even allow a flat and democratic organization structure (Davenport 1998). An opposite view is that companies have specialized processes (Markus & Tanis 2000) that they feel are their competitive advantage (Davenport 1998). They might find that an enterprise system hinders their business growth, strategic flexibility, and decentralized decision-making style. Business processes that are key processes from the company’s point of view, might be too hard, too slow, or too expensive to change. (Markus & Tanis 2000).

MacKinnon et al. (2008) take the view that enterprise systems have a positive impact on a company’s human capital and its flexibility (i.e., its organization structure, culture of flexibility, knowledge sharing and management, cross-functional training, outsourcing, and other non-traditional work arrangements like teleconferences). Enterprise systems support efficient interpersonal communication, increase employee satisfaction, and facilitate business learning. These factors all belong to organizational benefits that are achievable through enterprise system implementation (Shang & Seddon 2000). But there is always the risk of losing the competitive advantage (Markus et al. 2000b, Markus & Tanis 2000) by implementing an enterprise system that supports common global business processes (Markus & Tanis 2000, Scott & Vessey 2002).

MacKinnon et al. (2008) have evaluated the effects of enterprise systems from a strategic flexibility point of view. They argue that enterprise systems have a negative impact on a company’s operational flexibility because the business processes do not correspond well with the company’s business processes. On the other hand, it is costly to make technical and business process changes (Markus et al. 2000b, Markus & Tanis 2000).

There are many examples of unsuccessful implementation projects in the history of enterprise systems. These projects are cross-organizational, or in some cases, are even inter-organizational projects that have an effect on supply chain and industry structure. (Markus & Tanis 2000). Business process changes have a direct impact on the daily work of employees (Markus & Tanis 2000, Scott & Vessey 2002). New skills are needed to implement as well as use the system.
Organization climate change always has an impact on the implementation project (Scott & Vessey 2002).

**Business Data Quality and Visibility**

Managers seek efficiency and profitability with the added ability of extracting more information from integrated systems. Appleton (1997) believes that these kinds of benefits are achievable. Integrated enterprise systems remove redundant data entry (Davenport 1998, Markus *et al.* 2000a, Xu *et al.* 2002) and improve the capability of analyzing company business data (MacKinnon *et al.* 2008, Markus & Tanis 2000). Through enterprise system implementation, companies can take advantage of business data standardization (standardized numbering, naming, and coding schemas). At the same time, they can clean up their existing business data according to the new standards. Enterprise systems provide a possibility for multi-language and multi-currency IT support. (Markus & Tanis 2000). In the enterprise system benefit framework of Shang & Seddon (2002), business data quality and visibility create benefits that contribute to all benefit dimensions (see Table 3).

PLM systems are positioned to be responsible for product design and development (Conner 2004). Companies look to gain benefits by managing their product lifecycles (Conner 2004) and improving both quality and availability of product information inside the company (Malykhina 2005) as well as between companies and their partners (Conner 2004). The right product information in the right context at the right time is a requirement for being successful in today’s business environment (Dutta & Wolowicz 2005).

**Business Performance – Cost Reductions**

Ross & Vitale (2000) list cost reduction, strategic decision-making, and customer responsiveness as achievable benefits from enterprise system implementation. The ability to accommodate business growth and reduce business operating and administrative expenses are examples of the business reasons behind enterprise systems implementation (Markus & Tanis 2000). In the case of a company acquiring another company with its own IT systems, the acquiring company will benefit from product information consolidation through an integrated enterprise system like PLM. (O'Marah 2003).

Attainable business performance can be categorized as cost, strategic decision-making, or customer responsiveness (Ross & Vitale 2000) or operational,
managerial, strategic, IT infrastructure, and organizational benefits (Shang & Seddon 2000). The latter categorization is wider and also embodies the first categorization. Both categorizations are based on research of ERP systems. In the enterprise system benefit framework of Shang & Seddon (2002), business performance creates benefits that belong to the operational benefit dimension (see Table 3).

**Business Performance – Customer Responsiveness**

Organizational benefits are related to cost and cycle time reductions, and quality and productivity improvements (Shang & Seddon 2000). These benefits come from day-to-day activities that involve acquisition and consumption of resources. They are repeated periodically, such as daily, weekly, and monthly (Shang & Seddon 2002). Process automation and removal of redundant processes have been reported to reduce time spent on tasks from days to hours (Shang & Seddon 2000). Through process standardization, cycle time reductions (e.g., from customer order to delivery) are achievable (Ross & Vitale 2000).

A company can shorten its product time-to-market time by reducing the number of errors, using virtual development and testing (Conner 2004), and reusing existing parts, designs, technologies, and intellectual property (O'Marah 2003). Reuse of existing parts, designs, technology, and intellectual property also has its positive effects on total product development cost (Conner 2004, O'Marah 2003).

Markus & Tanis (2000) state that by using the data handling capabilities of integrated enterprise systems, companies are able to reduce inventory-carrying costs and stock outs, as well as eliminate delays and errors in customer deliveries. Through improved data visibility, companies are able to establish a single face to customers (Markus & Tanis 2000, Ross & Vitale 2000) and recognize global customers as single entities (Ross & Vitale 2000). In the enterprise system benefit framework of Shang & Seddon (2002), customer responsiveness creates benefits that belong to the operational benefit dimension (see Table 3).

**Business Performance – Strategic Decision-Making**

Enterprise systems open the possibility for improving company-wide decision-making support and of streamlining financial consolidations (Markus & Tanis
Improved management decision-making and performance control are managerial benefits that can be achieved through enterprise system implementation (Shang & Seddon 2000).

Access to online and real-time business data improves a company’s responsiveness to market conditions (Ross & Vitale 2000). Strategic level benefits come from activities that involve long-range planning and high-level decision-making, such as business mergers and acquisitions, market competition, product planning, customer retention, and capital sourcing (Shang & Seddon 2002). In the enterprise system benefit framework of Shang & Seddon (2002), strategic decision-making creates benefits that belong to the strategic benefit dimension (see Table 3).

### 2.4.3 PLM History

The origin of the PLM system is in the design engineering domain (Ameri & Dutta 2005), whereas the origin of ERP systems is in MRP (McGaughey & Gunasekaran 2007, Wah 2000). In the 1980s, the first CAD systems appeared on the market. CAD systems were highly technical pieces of software specialized in the creation and reuse of geometric product models. Computer aided manufacturing and computer aided engineering systems were developed in parallel with CAD systems. PDM systems were developed to respond to the need for controlling and managing product information created by the previously mentioned engineering tools. In the 1980s, these early PDM systems had the ability to ensure data integrity through a central data repository. (Ameri & Dutta 2005).

Functional development of PDM systems continued. New functionalities, like changes, workflows, and document and project management, were added. Still, the systems merely supported engineering processes, not business processes like sales, marketing, and supply change management. (Ameri & Dutta 2005, CIMdata 2002).

In the 1990s, PDM vendors started to offer web-enabled systems with a more user-friendly interface. These systems already supported the concept of extended enterprise, but the main focus continued to be on the engineering side. The concept of PLM was introduced in the 1990s, but later than web-enabled PDM systems. The PLM concept extends the PDM concept of supporting engineering processes by also supporting business processes like sales, marketing, and after
sales. It takes into account the whole product lifecycle providing support to capture, organize, and reuse product related knowledge. (Ameri & Dutta 2005).

PLM concept and product lifecycle definitions have evolved in parallel with each other. The definition, which gained ground during the 1980s, covered only design engineering. In the late 1980s, the view started to expand toward the current definition that considers the whole lifecycle, from the product idea phase to product disposal. (CIMdata 2002).

The same kind of transition has occurred with the organizational personnel responsible for buying PLM systems. Typical buyers of early PDM systems were mid-level managers, or occasionally, higher-level managers from a company’s IT department. As PLM is today considered a strategic business investment, the buyers, or at least the approvers, of the PLM investment belong to higher-level management like the CIO, Chief Technology Officer (CTO), Chief Financial Officer (CFO), and in some cases, even the Chief Executive Officer (CEO). (CIMdata 2002).

2.4.4 PLM System Implementation

In general, ES implementation is an expensive investment for a company. Wah (2000) states that ERP system implementation typically takes from one to two years. Davenport (1998) notes that the cost of ES implementation in large companies varies from USD $50 million to over USD $500 million. Based on these figures, it is quite obvious that there are companies specialized in ES implementation. Unfortunately, Small and Mid-size Enterprises (SMEs) cannot afford to put large amounts of money into their ES system implementation. (Scheer & Habermann 2000). Some enterprise system vendors offer fixed-price implementation projects for SMEs. These projects include software licenses, hardware, installation, and a certain amount of services. (Hoch et al. 2000).

McGaughey & Gunasekaran (2007) list the following challenges regarding ERP system implementation: the cost of the system, alignment between information and business models, implementation issues like integration with other systems, interoperability, resistance to change, and post-implementation problems. Holland & Light (1999) add legacy systems, changes to business processes, and the need to change software to the previous list.

In the beginning, the performance of a system might not be at the level planned. New ways of working, practices, and some manual activities that are
needed because of a lack of functionality in the enterprise system, might slow business process throughput. The end users are not experienced with the system, so data entry errors might occur. To solve the errors and slow downs, extra resources might be required. The data input errors also affect data quality. Long process lead-time has its effects on customer and supplier relationships. The response time to customer enquiries might be longer than it was before the implementation of the enterprise system. (Markus et al. 2000a).

PLM systems are one function of an enterprise system. We argue that they share the same implementation challenges as enterprise systems in general. That is why we use enterprise system literature as sources for discussing more details about the challenges of PLM system implementation.

Balancing between Configuration, Customization and Business Process Re-engineering (BPR)

If a company wants to implement the built-in best practices of an enterprise system, certain changes to its internal business processes may be required, i.e., process reengineering. According to Markus & Tanis (2000), there is general consensus that business process reengineering is a risk to the enterprise system implementation project. It is also an additional cost to the project. These are all related to the fact that large-scale human and organizational changes are difficult to manage. (Markus & Tanis 2000). On the other hand, business process changes are preferable compared with customizing the system (Appleton 1997, Lucas et al. 1988). If there are problems or inconsistencies in the processes, they will not be fixed by using a new system. Problems have to be fixed before the new system can be used (Appleton 1997).

An enterprise system is a collection of assumptions about business processes and the content that the software vendor has developed during the development phase (Davenport 1998). Messerschmitt & Szyperski (2003) indicate that for a company’s organization and business processes to fit the built-in assumptions, the company would need to redesign its organization and business processes. Companies that implement an enterprise system must balance between enterprise system configuration, customization, and Business Process Re-engineering (BPR) (Davenport 1998, Holland & Light 1999). Failures in BPR and in system configuration are the major source of end user dissatisfaction, although the hardware, network, and training requirements cause continuous problems to firms implementing enterprise systems (Scheer & Habermann 2000).
Customization means that the enterprise system is either configured, extensions are added to it, or that some parts of it must be rewritten to correspond to the firm’s existing business processes (Davenport 1998). System configuration options give some level of flexibility to merge software vendor assumptions with company business processes, but it does not offer a complete solution for the issue (Messerschmitt & Szyperski 2003). In this context, BPR means that the firm’s business processes are changed to respond to the enterprise system’s processes (Davenport 1998).

The first step in configuring an ES is for a company to select the solution modules it will implement from among those available (Davenport 1998). Some enterprise systems include configuration tables that can be used when configuring the system to fulfil the company’s business needs. Although an enterprise system may include thousands of configuration tables, it gives limited possibilities for altering the way an enterprise system operates. (Markus & Tanis 2000). A company can always rewrite part of the enterprise system code, or it can continue to use the existing systems and build an integration between the enterprise system and the legacy system (Davenport 1998). It can also create add-ons (Markus et al. 2000b, Markus & Tanis 2000) or integrate either an in-house build or independent vendor-developed software packages (Markus et al. 2000b) to improve the system’s feature-function fit (Markus et al. 2000b, Markus & Tanis 2000).

Although it is strongly advised to avoid modification of the software, in many cases it cannot be totally avoided (Markus et al. 2000a). Non-core customization means that the customization is done by using add-on modules or by using other facilities like a report writer. Core-customization means that the enterprise system’s source code is modified. (Soh et al. 2000). Neither of these choices is ideal. Both of them are expensive and timely to implement and maintain. In some cases, it may cause extended problems with the company and its suppliers or customers. It is quite common that certain enterprise systems are de facto standards within a certain industry. Heavily customized systems may be incompatible with other systems in the industry. (Davenport 1998).

If an enterprise system includes customizations, such as rewritten code, or user-specific configurations, every time the system is upgraded the company must go through all modifications (Davison 2002). A suggestion of Bagranoff & Brewer (2003) is that the general rule for enterprise system customization is that the less customization, the better. Fewer customizations ensure a smoother software upgrading process (Bagranoff & Brewer 2003, Soh et al. 2000).
Instead of configuration or customization of an enterprise system, a company could try to find workarounds for identified process misfits. Workarounds mean finding a solution to provide needed functionality without configuration or customization of an existing enterprise system. In case of a manual workaround, tasks are performed manually. A workaround may also mean finding an alternative way to perform the required function using the enterprise system software package. (Soh et al. 2000).

Clear Roles and Responsibilities and Good Communication are Key to Success

A firm can always develop an enterprise system from scratch, but today it is quite common to purchase the system from a software vendor. In this case, the end user organization can hire consultants who have experience in implementing the same system in other firms to either assist or complete the system configuration, process re-engineering, possible reorganization, and training activities. (King 2005, Markus et al. 2000a).

It is common for several companies with different roles and responsibilities to be involved in an ES implementation. In the enterprise application model of Messerschmitt & Szyperski (2003), there is an application software supplier and an infrastructure software supplier who are responsible for software development and delivery to the consultant for configuration and deployment organization responsible for provisioning. The end user organization is responsible for most of the implementation and system use activities, such as network operation and application hosting and operation.

Only a few companies are willing to take responsibility for end-to-end coordination of an implementation. Companies are willing to pay large sums of money for the assistance of consultants, but they are not willing to outsource the project management responsibilities of the enterprise system implementation project. (Messerschmitt & Szyperski 2003). It is common for consultant firms hired for such a project do not know how to cooperate with each other (Markus et al. 2000a). Communication between the consultants and the representatives of the client company has an important role in the success of the implementation project (King 2005). Consultant firms may have problems keeping the same personnel through the whole implementation project. Customers value this as being important. Some customers have even faced problems with the consultant’s knowledge about the enterprise system itself. (Markus et al. 2000a).
System Supplier Selection

When a customer organization decides to purchase a certain enterprise system, it locks itself into the vendor (Messerschmitt & Szyperski 2003). This means that the customer organization is more or less forced to use the vendor’s solution for a long time because the costs of switching to another product might be considerably high (Messerschmitt & Szyperski 2003, Porter 2008). Experience using the solution also increases the barrier to switching to another solution (Hoch et al. 2000). On the other hand, the vendor obtains business advantages in this situation by selling solution upgrades and extensions to its initial customer base (Messerschmitt & Szyperski 2003).

Various issues should be taken into consideration when selecting an enterprise system and its vendor: how well the system meets the company’s capabilities, functionality, quality, usability, and performance requirements and what kind and how much business process re-engineering and end user training are needed. (Messerschmitt & Szyperski 2003). A vendor should be capable of working in close cooperation with the customer when reviewing the system and identifying possible gaps between the customer’s requirements and needs and the system functionality (Lucas et al. 1988).

Possible integration with other systems should be reviewed during the vendor selection process. It is also important to review what kind of information export and import features the candidate system has and what the information format requirements are. The software vendor should also be able to present technical support and maintenance concept. It should present also system roadmap, which defines the system capability and functionality evolution plan (Messerschmitt & Szyperski 2003). The vendor should be capable of supporting system implementation (Lucas et al. 1988) and providing education or consulting support for the customer’s implementation project members (Lucas et al. 1988, Wah 2000). The vendor’s financial status and reference information are also needed to evaluate the vendor’s viability (Messerschmitt & Szyperski 2003).

Organizational and Cultural Challenges

Enterprise system implementation is not only a matter of money and technical issues. It also has a direct impact on a company’s organization and business culture (Davenport 1998). Davenport reports that those companies that do not
take into consideration the full business implication when planning to implement an enterprise system have had the biggest problems during the project. In some cases, these problems have resulted in a real disaster, even bankruptcy.

Global companies have to decide what the acceptable level of country-specific processes and data will be. Also, local regulations make certain requirements of an enterprise system implementation in a global operating environment. In some cases, instead of implementing one centralized enterprise system, companies end up implementing several country or regional-specific versions of the same system. (Davenport 1998).

Enterprise system software vendors come mainly from Europe or North America. The processes built into enterprise systems mirror the manner of working in those parts of the world, which is different from the Chinese and Southeast Asia business culture and organizational practices. (Davison 2002).

Enterprise system implementation allows the introduction of consistent and disciplined operating practices across the company. It might also mean changes in employee job descriptions, required job skills, and knowledge. Employees may be expected to make independent decisions about their work. The responsibility for managing one's own work is generally considered to be a positive and appropriate aim. But in some cultures, like China, people feel much safer when they are told what to do. (Davison 2002). These types of cultural differences should be taken into consideration when implementing an enterprise system into a global operating environment.
3 Software Product Business Environment

“A company’s marketing environment consists of the actors and forces that affect the company’s ability to develop and maintain successful transactions and relationships with its target customers” (Kotler 1991: 129). A marketing environment can be divided into macro and microenvironments. A macro environment presents uncontrollable forces, including demographic, economic, natural, technological, political/legal, and social/cultural forces. Companies need to monitor these forces independently. Especially in a global environment, they also need to monitor the causal effects of these forces. (Kotler 1997).

“Microenvironment consists of the actors in the company’s immediate environment that affect its ability to serve its markets: the company, suppliers, market intermediaries, customers, competitors, and publics” (Kotler 1991: 129). Suppliers are business firms and individuals who provide resources needed by the company and its competitors to produce goods and services. Market intermediaries are firms that aid the company in promoting, selling, and distributing its goods to final buyers. A company links itself with suppliers and market intermediaries so that it can efficiently supply appropriate products and services to its target market. The public is any group that has an actual or potential interest or impact on a company’s ability to achieve its objects. Every company faces several public groups, such as financial, media, and government. (Kotler 1991).

Increased market globalization is affecting distribution of work within and among business networks (Freytag & Ritter 2005). Relationships between companies and their customers have changed. Indirect distributor-managed relationships have replaced direct relationships. Distributors have a strong position within business networks. (Möller & Halinen 1999). Outsourcing is seen as one of the main consequences of globalization. So far, focus has been on outsourcing manufacturing, but in the future, functions such as knowledge creation and innovation will come within the scope of outsourcing. (Freytag & Ritter 2005).

According to Möller & Halinen (1999), companies are forced to increase their operational efficiency because removal of regulatory barriers has opened markets for global competition. Customers are demanding products with competitive prices and high quality. As a response, companies are streamlining their supplier networks, ensuring that each member of the network is specialized into the activities, which are best supported by its core competencies. The positive
effects of a network include increasing value of a product or service as the number of people using it grows. This will create value and remove barriers to entry in business. On the other hand, members of a single network will share a common fate, which means that together they can either raise or fall. (Iansiti & Levien 2004a).

Business networks are continuously evolving (Low 1997). No network member has overall control over its network, although more strongly connected and controlled actors may exist (Wilkinson & Young 2002). Companies should be aware of their position within their network. They should be observant about what is happening in the network and react accordingly in order to keep and improve their position in the network. (Low 1997). However, companies cannot operate freely inside their network (Håkansson & Ford 2002). Although network members try to achieve their own objectives, they must simultaneously take into account the effects of their actions and responses of other network members (Wilkinson & Young 2002). To be successful, a company should get approval for its operations or changes from the other members of the network (Håkansson & Ford 2002).

This chapter provides an overview of the software product business environment through software ecosystem and business network literature. The first section discusses software ecosystems, software supply networks, and network management in connection with the ecosystem (Section 3.1). The following sections look at common members of a software ecosystem, such as suppliers (Section 3.2), consultants (Section 3.4), customers (Section 3.5), partners (Section 3.6), competitors (Section 3.7), and public bodies (Section 3.8). Section 3.3 considers intermediaries and Section 3.3.4 formulates a definition for VAR, which is the main research interest of the research at hand.

3.1 Software Ecosystems

Researchers reference biological ecosystems as being analogous to studying business ecosystems (Bosch 2009, Iansiti & Levien 2004a, Iansiti & Richards 2006, Jansen et al. 2009a, Jansen et al. 2009b, Peltoniemi & Vuori 2005). In addition, industrial, economic, digital business, and social ecosystem analogies are used in business ecosystems researching literature (Peltoniemi & Vuori 2005). Peltoniemi & Vuori (2005) reviewed the definition of ecosystem from different viewpoints. They conclude that a business ecosystem is a “dynamic structure,
which consists of an interconnected population of organizations.” They are loose networks of suppliers, distributors, out-sourcing firms, marketers of related products or services, technology providers, and a host of other organizations that affect and are affected by the creation and delivery of a company’s own offerings. A company’s business ecosystem includes companies that are responsible for outsourced business functions. It also includes institutions that provide financing services, and agencies such as regulatory agencies. Companies that provide technology needed to carry out the company’s business, or that provide complementary products are also members of a business ecosystem. Even competitors and customers are business ecosystem members of a company. An ecosystem typically encompasses several domains, which it may share with other ecosystems. (Iansiti & Levien 2004a).

Iansiti & Richards (2006) define IT ecosystems as a “network of organizations that drives the delivery of information technology products and services.” On the other hand, Jansen et al. (2009a: 35) defines software ecosystems as “a set of businesses functioning as a unit and interacting with a shared market for software and services, together with the relationships among them.” “These relationships are frequently under-pinned by a common technological platform or market and operate through the exchange of information, resources and artefacts” (Jansen et al. 2009b). According to Bosch (2009), a software ecosystem “consists of the set of software solutions that enable, support and automate the activities and transactions by the actors in the associated social or business ecosystem and the organizations that provide these solutions.” He states that a software ecosystem is also a commercial ecosystem. The preceding definitions are consistent with the conclusion of Peltoniemi & Vuori (2005).

As the scope of the research at hand is PLM systems and their functionality and as part of the PLM system definition we have stated that they are built around commercial, packaged software, we define PLM systems context as an IT ecosystem, which is a network of organizations that drives the delivery of information technology PLM systems and related services (Iansiti & Richards 2006). PLM systems context is not only a software ecosystems, because integral parts of the PLM systems are hardware components and various types of services.

A widely used view of software ecosystems is the view of Messerschmitt & Szyperski (2003: 174). It is a framework for value networks in the software industry (Warsta & Seppänen 2007). It consists of eight business functions, linkages between the functions, and results of the functions. Warsta & Seppänen
(2007) have extended the conceptual framework of Messerschmitt & Szyperski (2003) according to the results of their analysis of the top software business start-ups (see Fig. 4).

Compared to the original framework of Messerschmitt & Szyperski (2003: 174), Warsta & Seppänen (2007) added new business functions, different types of partners, and Hardware Developers (HW-D). They have also found new roles for consultants. They added a new value network between Application Software Developers (ASD) and Infrastructure Software Developers (ISD) and end-customers. They label these networks as short-circuits. They divided the system and infrastructure integrator function into channel and system integrator functions. We have grouped the business functions as Partners, Suppliers, Intermediaries, and Consultants. We use this grouping later in the research at hand.

The next sections discuss the specific characteristics of software ecosystems. Certain characteristics limit the scope of the software ecosystem. Other characteristics give view to an ecosystem’s business opportunities and threads. There are also characteristics that determine the health of an ecosystem.
Moore (1993) presents a lifecycle view of a business ecosystem based on four evolutionary stages: birth, expansion, leadership, and self-renewal or, if not self-renewal, death. The research at hand uses these business ecosystem lifecycle stages in the context of a software ecosystem.

In reality, the limits of evolutionary stages are blurred, and the managerial challenges of one stage often crop up in another. During the birth stage of a software ecosystem, a company works with customers and suppliers to define the new value proposition around a seed innovation. It tries to tie up critical lead customers, key suppliers, and important channels. But at the same time, it must protect its ideas from outsiders who might be working toward defining similar offers. (Moore 1993).

At the expansion stage, an ecosystem brings the new offering to a large market by working with suppliers and partners to scale up supply and to achieve maximum market coverage. It defeats alternative implementations of similar ideas to ensure that its approach is the market standard in its class by dominating key market segments. (Moore 1993).

The leadership stage provides a compelling vision for the future that encourages suppliers and customers to work together to continue improving the complete offer. The ecosystem maintains strong bargaining power in relation to other players in the ecosystem, including key customers and valued suppliers. (Moore 1993).

The self-renewal stage of a business ecosystem occurs when mature business communities are threatened by rising new ecosystems and innovations. It might also undergo sudden new environmental conditions that include changes in government regulations, customer buying patterns, or macro-economic conditions. During this stage, an ecosystem works with innovators to bring in new ideas to the existing ecosystem. It tries to maintain high barriers to entry to prevent innovators from building alternative ecosystems. If it succeeds in maintaining high customer switching costs, it can buy time to incorporate new ideas into its own products and services. (Moore 1993). According to Peltoniemi & Vuori (2005) the view of Moore (1993) leaves open what happens after successful self-renewal.
External View of Software Ecosystems

The external view of software ecosystems concentrates on issues that limit the scope of software ecosystems. A software ecosystem can be market-oriented, which means that it is centred on one specific market such as the ERP or CAD market, or mid-sized companies within a certain field. A software ecosystem can be technology-based or focused on one platform. (Jansen et al. 2009a).

A domain-specific software ecosystem or domain-specific platform software ecosystem is organized around an application for which an Application Programming Interface (API) has been opened to third party developers (Bosch 2009). A software ecosystem can also be built around one firm, like the Google software ecosystem or the Microsoft software ecosystem (Jansen et al. 2009a). Geographical scope, component specification, license restrictions (Jansen et al. 2009a), governmental restrictions, taxes, and tariffs (Peltoniemi & Vuori 2005) can further limit the scope of a software ecosystem.

Organizations like keystone organizations and organizations that define how a software ecosystem acts and develops itself, provide another perspective of a software ecosystem. An outsider is interested in past and current customers of a software ecosystem and its connections to other software ecosystems. Whether viewing a software ecosystem externally or internally, in both cases ecosystem members are a point of interest. (Jansen et al. 2009a).

Internal View of Software Ecosystems

The internal characteristics of a software ecosystem specify an ecosystem’s business opportunities and threads. They define the possible influence ecosystem members have to change the behaviour of the software ecosystem. (Jansen et al. 2009a).

Substantial investments in Research and Development (R&D) to ensure that customer needs are fulfilled are drivers for a company looking for an opportunity to join a software ecosystem (Bosch 2009). Internal characteristics such as the financial size, technologies and platforms being used, stability, history, recent development (Jansen et al. 2009a), reputation, entry barriers, and organization openness (van den Berk et al. 2010) mirror the opportunities that the ecosystem can offer a company looking for an appropriate ecosystem to join (Jansen et al. 2009a).
In a complex network structure, a hub is a node that is more richly connected than other nodes. Hubs decrease the complexity of coordination and integration of a network. (Iansiti & Levien 2004b). In a software ecosystem, a hub can be a keystone, dominator or hub landlord, each of which has its own value creation and value capturing strategies (Iansiti & Levien 2004b). A keystone organization (Iansiti & Levien 2004b) or central hub is the owner of the platform (van den Berk et al. 2010) that the niche players can use to create value for themselves (Jansen et al. 2009a, van den Berk et al. 2010).

In a keystone strategy, a keystone organization creates and shares value with the rest of the ecosystem (Iansiti & Levien 2004b, van den Berk et al. 2010). It is responsible for ecosystem orchestration, which defines the arrangement, coordination, and management of actors and networks (Jansen et al. 2009a).

According to a dominator strategy, a dominator organization is responsible for most of the value creation in an ecosystem (Iansiti & Levien 2004b), but it still seeks to extract as much value from the ecosystem as possible (Iansiti & Levien 2004b, van den Berk et al. 2010). An organization that follows the hub landlord strategy creates little, if any, value by itself, but it captures most of the value for itself (Iansiti & Levien 2004b). In the short run, a dominator strategy can be very successful, but in the long run it might destroy the whole software ecosystem (Jansen et al. 2009a). The same can be said about hub landlord strategy (Iansiti & Levien 2004b).

Niche players develop specialized capabilities that differentiate themselves from other companies in the ecosystem. They have or can develop unique capabilities while leveraging services provided by the keystone(s) in their ecosystem. Niche players collectively create value and capture much of the value they create (Iansiti & Levien 2004b). Niche players (participants) must be able to assess the relative strengths of the keystone organizations they support and define their own roles and strategies within the ecosystems. If a niche player chooses to be an influencer, its strategy is to commit early and prominently to one keystone strategy. In this case, there is always a risk that the supported platform may not become the industry standard, which may lead to the situation that the niche player’s business is no longer profitable. A niche player that follows a hedger strategy develops its products or services to support multiple keystone platforms. The niche player minimizes the business risk by using several competing platforms, but at the same time suffers higher costs caused by the requirements to meet multiple platform standards. In a disciple strategy, a niche player commits exclusively to one keystone platform, which is a clear strategic focus and
direction, but runs the risk that the supported platform may not be adopted. (Hagel et al. 2008, van den Berk et al. 2010).

View of Software Ecosystem Health

To function effectively, each domain that is critical to delivery of a product or a service in an ecosystem should be healthy. Weakness in any domain can undermine the performance of the whole ecosystem. (Iansiti & Levien 2004a).

A healthy ecosystem is productive (Iansiti & Levien 2004a, Jansen et al. 2009a). It means that a network is capable of consistently transforming technology and other raw materials of innovation into lower costs and new products (Iansiti & Levien 2004a, Iansiti & Levien 2004b). It also describes the activeness of the ecosystem, i.e., how much business is created, how much value is added, and how many players are joining (Jansen et al. 2009a). The simplest way to measure the productivity of an ecosystem is to calculate the return on invested capital, but other measurements also exist (Iansiti & Levien 2004a).

Another characteristic of a healthy ecosystem is its robustness (Iansiti & Levien 2004a). This refers to whether the business ecosystem is capable of surviving disruptions such as unforeseen technological change (Iansiti & Levien 2004a, Iansiti & Levien 2004b), removal of a keystone, or the demise of a large portion of niche players (Jansen et al. 2009a). It can be measured by survival rates of ecosystem members either over time, or relative to comparable ecosystems (Iansiti & Levien 2004a).

One measurement of health status is the capability of the ecosystem to increase diversity through the creation of valuable new functions or niches (Iansiti & Levien 2004a, Iansiti & Levien 2004b), the capability of old actors to jump into new business opportunities (Jansen et al. 2009a), or the capability of increasing the number of new products or product options, technological building blocks, categories, or businesses (Iansiti & Levien 2004b). Although a healthy ecosystem creates new niches, it does not necessarily mean that the old niches persist. Decreased diversity in some areas of an ecosystem might enable the creation of niches in other areas. (Iansiti & Levien 2004a).
Organization Centric View to Software Ecosystems

The organization -centric perspective looks at the measures software-related business can create or leverage the surrounding software ecosystem (Jansen et al. 2009a). For software suppliers, software ecosystems are the widest strategic perspective they need to focus on. At the software ecosystem level, a software supplier makes decisions regarding how to maximize profitability and how to orchestrate the ecosystem to keep it vibrant and profitable. At the Software Supply Network (SSN) level, a software supplier makes strategic decisions regarding its direct suppliers and customers. The software vendor level is the lowest strategic level of a software ecosystem. At this level, a software supplier focuses on maximizing its own profits. (Jansen et al. 2009b).

3.1.1 Software Supply Networks

An abstract definition for a business network is that it is a combination of nodes that are connected between each other by threads. In a business network, nodes are companies and threads are business relationships between the companies. (Håkansson & Ford 2002). According to the definition of Wilkinson & Young (2002) “channels and networks are connected systems of actors and relationships in which no one firm can dominate.”

Jansen et al. (2007: 677) define an SSN as “a series of linked software, hardware, and service organizations cooperating to satisfy market demands.” Its strategic focus is narrower than the corresponding focus of a software ecosystem. SSN level strategic decisions concern issues such as who the software vendor’s immediate buyers and suppliers are and how to keep the relationships between them alive and increase the strength of the relationships. A network can consist of several levels of buyers or suppliers (from second-tier to nth-tier). There are various possibilities for activating relationships, such as organizing regular supplier or customer meetings and workshops, or developing customer and reseller portals. (Jansen et al. 2009b).

Messerschmitt & Szyperski (2003: 173) present a definition similar to that of Jansen et al. (2007) when they discuss software value chains, which are, according to their definition, “chains that capture the major functions that must be brought together to put a working software application in the hands of users.” The definition of Jansen et al. (2007) focuses on organizations and the results of their actions. Although the name of the definition of Messerschmitt & Szyperski
(2003) is software value chain, it focuses on business functions and linkages between business functions and the results of business functions.

Both preceding definitions fail to capture the value to the customer, which is present in the marketing channel view of Stern & EL-Ansary (1992). They define marketing channels as orchestrated networks that create value for the customer. Both Coughlan et al. (2001: 3) and Stern & EL-Ansary (1992: 1) state that “A marketing channel is a set of independent organizations involved in the process of making a product or service available for use or consumption.” Marketing channels are alliances where several independent and different types of companies are dependent on each other. A marketing channel is also a process, the purpose of which is to fulfil the needs of end-users. An end-user can be an individual customer or a professional customer, i.e., another company. (Coughlan et al, 2001).

Jansen et al. (2007) argue that the requirements of Supply Chain Management (SCM) of software products are different than the requirements of physical goods SCM. Their reasoning is that the traditional SCM literature does not discuss product maintenance, which is typical for software products. They also argue that the quality requirements of software products are lower than that of other products, which increases the need for product maintenance. According to them, the literature ignores the discussion about the information needs inside the supply chain, which is an integral part of product maintenance. There is also an obvious need for feedback information in horizontal relationships, like those between manufacturer and supplier. But according to Jansen et al. (2007), conventional literature lacks this discussion. They claim that their theory of software supply networks manages to fill the holes of earlier theories.

Jansen et al. (2007) also discuss the differences between value chains and software supply networks. According to them, value chains do not provide a full solution for the challenges regarding software products because the focus of value chains is on one product, whereas software supply networks “address networks of software systems that interact to provide software services.” They also criticize the value chain model of Messerschmitt & Szyperski (2003), saying that the model fails to cover relationships between component off-the-shelf vendors and application developers. The extended framework of Warsta & Seppänen (2007) (see Fig. 4) fulfils this gap.

The research at hand follows the SSN definition of Jansen et al. (2007) as the definition for the PLM systems supply network because according to the authors,
their definition takes into account the special requirements of software products such as the need for maintenance and service.

In general, SSN consists of product context, which defines the software service operations context and related software, hardware, and service products needed for delivering the software service. The other part of SSN is the supply network. (Jansen et al. 2007).

**Elements of Software Supply Networks**

The Software Supply Network (SNN) model of Jansen et al. (2007) consists of two elements. Product context describes “the context, in which a software service operates, and the software products, hardware products, and software services that are required to provide the software service”. Supply network displays “all participants in a SSN, the connections between these participants, and the flows describing the type of product that is traded across these connections.”

Decoupling points in a supply network are the points where demand and supply meet. For example, if requirements engineering is outsourced, the decoupling point is when the output from the outsourced requirements engineering comes back to the supply network. (Jansen et al. 2007). Trade relationships connect the participants of the SSN to each other. A trade relationship has one or more flows (product flow, content flow and service flow). (Brinkkemper et al. 2009).

Brinkkemper et al. (2009) further divide the SSN into supply and delivery. The supply part is the network that consists of companies that act as suppliers to the company of interest. The delivery part of an SSN is responsible for delivering and deploying a software product or a service to customers. The authors call this part a distribution channel.

The software value chain definition of Messerschmitt & Szyperski (2003) has two value chains: Requirements Value Chain and Supply Value Chain. The scope of the requirements value chain is to gather business ideas, application ideas, and end user requirements; its output is a detailed set of requirements for implementation. (Messerschmitt & Szyperski 2003: 122).

The supply value chain starts from the software vendor and ends by provisioning valuable functionality and capability to the end user. Its four stages can overlap, i.e., the implementation stage may overlap the provisioning and operation stages in time, the provisioning stage may overlap the operations stage, and the operations stage may overlap the use stage. The implementation stage is responsible for requirements, architecture, programming, laboratory environment
testing, and end-user testing of the software. Its output is a software product that can be sold and delivered to customers and used by end users. (Messerschmitt & Szyperski 2003: 122).

The provisioning stage focuses on facilities such as networks, servers, desktop computers, etc. The software is installed and tested in the use environment. If required, the software is integrated with the existing systems and with the software delivered by other vendors. If there is a need to change the company’s organization or business processes, these changes are made during the provisioning stage. The output of this stage is software that is ready to use. The operation stage makes sure that the software is up and running in a reliable and secured way. During the operation stage, end users need support in order to use the system in an efficient way. If any problems arise or if there is a need to make changes to the software, it is indicated to the vendor. During the use stage, the software functionality provides direct value to the end users and to the end-user organizations. (Messerschmitt & Szyperski 2003: 122).

When compared to the SSN definition (Jansen et al. 2007) and related supply and delivery parts definition (Brinkkemper et al. 2009), the implementation stage belongs to the supply part of an SSN, whereas the provisioning, operation, and use stages are related more to the delivery part of an SSN.

Supply Network and Delivery Network

A supply network is further broken down into supply and delivery parts (Brinkkemper et al. 2009). The break down is based on the position or role of the company of interest (Brinkkemper et al. 2009). The delivery network of a software supply network consists of channels. The simplest type of channel is a direct channel where a customer purchases a software product directly from a software vendor. In an indirect channel, a customer does not have any contact with a vendor, but instead purchases the product from an intermediary. An intermediary can be reseller, agent, or value added partner. A supply vendor may always use a channel type that is a mixture of both direct and indirect channels. (Brinkkemper et al. 2009).
Traditional marketing channel formats are based on three main actors: producer, distributor, and consumer. Producers are the manufacturers or originators of products or services. Between these two ends of the spectrum, there are various intermediaries, wholesalers or retailers who have different roles and responsibilities in the channel. (Coughlan et al. 2001). Satisfying the needs of customers is the primary reason for a distribution system to exist. Both a supplier and its distributors may need to adjust their commitment to each other to serve customer needs better. (Kim 2001).

The member who acts as initiator for establishing a channel for a product or service and who maintains internal channel links is a channel captain. Quite often, a producer is the channel captain, but not necessarily always. (Coughlan et al. 2001). Marketing channels can also be based on functions. Manufacturer-direct is an example of manufacturer based channel format, where a product is shipped and serviced from the manufacturer’s warehouse. Either the manufacturer’s own sales organization or agents are responsible for selling the product. Department stores are based on the retailer-based channel format. VARs and Influencer-Specifiers are service-provider-based channels. In general, channel members should attend to channel flows only if they either add value or reduce channel costs by participating. (Coughlan et al. 2001).

Brinkkemper et al. (2009) name three main types of software distribution channels when they conducted research to define a method for describing product and business models for the software product industry. The main channel types are direct channels, indirect channels, and a combination of direct/indirect channels. Direct channels are the simplest type of distribution channels; a customer purchases the product directly from a software vendor. (Brinkkemper et al. 2009). Warsta & Seppänen (2007) call direct channels short-circuits since they are direct connections between ISD and ASD types of companies and their end user organizations (see Fig. 4).

In an indirect channel, the customer does not have any direct contact with the software vendor. Instead, the product is delivered through one or more intermediaries to customers. This specific distribution arrangement has three actors: the supplier, the intermediary, and the buyer. This is a micro-net structure called a triad (Geersbro & Vedel 2008). A more generic definition for triads is that it consists of a focal organization, two other organizations, and their relationships (Ritter 2000). Triads are relationships involving interaction between all three
parties. An open triad has a serial-like structure that should be considered as two interconnected dyads. A closed triad is a group-like triad that involves interaction among all three parties to more or less the same extent. They should be considered as triads. (Havila et al. 2004). The mutual influence relationships in triads and the interconnectedness can be studied based on three possible basic effects of interconnectedness: a positive, a negative or a zero influence (Ritter 2000).

Brinkkemper et al. (2009) identify the following indirect channel sub types: reseller, agent and reseller, and value added partner or reseller. In a channel, an intermediary can be a supplier’s distributor, a buyer’s provider, or trader-coordinator-integrator. In addition to acting as traditional trader, it is also the coordinator of complex logistics arrangements and integrator of the buyer and supplier’s activities and communication in the value-creation process (Geersbro & Vedel 2008).

Reseller and agent and reseller types of indirect channels are typically used when selling products that remain unchanged through the distribution process. Intermediaries take their own share from the actual retail price of a product. In a value added partner or reseller mode, the channel intermediary creates a new product by combining the software vendor’s product with other products from other suppliers. The combined product is then distributed to the customer. A software vendor selects the direct/indirect channel combination if it wants to sell more products with the help of intermediaries. In this mode, the software vendor sells directly to certain customers and uses indirect distribution channels with other customers. (Brinkkemper et al. 2009).

The scope of the research at hand considers channel modes that use VAR as an intermediary. In a VAR mode, the channel intermediary creates a new product by combining the software supplier’s product with the products of other suppliers. That product is then distributed to the customer. The supplier, VAR, and customer may also form a closed triad. The research at hand takes this possibility into consideration (Ritter 2000).

3.1.2 Network Management

From a network management point of view, understanding networks, their structures, processes, and evolution is crucial. Möller & Halinen (1999) categorize network management into four interrelated levels to manage the
complexity of industry networks. The first management level is *Industries as Networks*, where industries are described as networks to understand companies and their behaviour. Their view is that network theory like Håkansson & Snehota (1995) provides a good framework that uses concepts like actors, resources, and activities for describing the functions within an industry. The second management level is *Managing Focal Nets and Network Positions* – “Firm in a Network.” Its purpose is to understand the company’s position in the network, its role, the network forces that influence the company, and the company’s strategy for keeping or changing its position in the network. Möller & Halinen (1999) introduce the concept of focal net, which consists of those actors that management values as relevant and are inside the company’s view.

The third management level in the definition of Möller & Halinen (1999) is *Managing Relationship Portfolios*. At this level, a company makes decisions about which activities it executes internally and which it will execute externally using other network actors. From the management point of view, relationships should be managed as portfolios because different relationships require different actions to ensure profitability. Low (1997) supports this view. Business relationship portfolios should consist of different types of business relationships; some should be long-term, some shorter-term, and some could even be *ad hoc* types of relationships. A business relationship portfolio is under continuous change. Some existing relations are put on hold or even terminated and new relationships are established. There is also an on-going learning process regarding business relations. (Low 1997).

The last network management level in the definition of Möller & Halinen (1999) is *Managing Exchange Relationships*, which highlights a company’s ability to create, manage, and conclude important relationships. There is also a need to evaluate the future value of a relationship. For example, a company should consider a customer’s lifetime value.

Network management requires certain capabilities. A *Network Visioning Capability* includes management skills and competencies that are needed in creating valid views of networks and their potential evolution. *Network Management Capability* refers to the ability to mobilize and coordinate the resources and activities of other actors in the network. This capability is needed especially in value creation networks such as supplier networks, customer networks, and R&D networks. At the first level of network management, special attention should be paid to value activities that add value to network actors, especially to end customers. The *Portfolio Management Capability* includes both
analytical aspects (e.g., the ability to create different types of actor evaluations) and organization aspects (e.g., the ability to develop organization solutions). (Möller & Halinen 1999).

Our view of network management is “firm in a network.” Our aim is to understand the VARs position in its network, the VAR’s role, network forces that influence the VAR, and the VAR’s way of maintaining and changing its position in its network. (Möller & Halinen 1999). Networks have actors. When discussing these actors, we use the modified categorization of landscape of the most promising high-tech companies (Warsta & Seppänen 2007). See Fig. 4.

3.2 Suppliers

Companies, with a core business and main product of software design and development form the centre of a software business, but can be differentiated based on the nature of their business. One group of software companies are subcontractors who do not have a software product of their own. Their business is to offer software design and development services to other companies. Another group includes those companies that design and develop customer-specific software. In practice, customer-specific software is always unique, although companies try to keep customization work to a minimum. The third group are those companies that have a software product or products of their own. Their business is based on selling software licenses and software related services. The last group of software companies are companies that design and develop embedded software. (Ali-Yrkkö & Martikainen 2008).

The software ecosystem framework of Messerschmitt & Szyperski (2003: 174) is a framework of value network in the software industry. Fig. 4 presents the conceptual framework with extensions of Warsta & Seppänen (2007). Key players of software value chains perform activities that are needed to deliver a working solution to a customer. ASDs and ISDs are both key players and software developers. They must both try to fulfil as many requirements as possible to ensure as large a market share as possible. But the source of the requirements is different. The difference between the software products of these two actors is that the software product of the ASD (i.e., application software) fulfils detailed requirements of various end user groups, but the software product of the ISD (i.e., infrastructure software) is a service platform for different types of software applications. An ASD must take into consideration and understand the
implications of the application for the end user’s business processes and organization structure. ISDs have the same challenge as ASDs. An ISD must understand a variety of different types of applications and their needs to be able to develop infrastructure software suitable for several different types of applications. (Messerschmitt & Szyperski 2003).

Warsta & Seppänen (2007) have added HW-Ds to the framework of Messerschmitt & Szyperski (2003: 174). They argue that HW-D firms belong organically to the ecosystem where they have an important role in overall information and communication technologies and in creating value. They especially have an important role in the ISD business but they can also act as a system integrator in the ecosystem.

Jansen et al. (2009b) define the software developer level as “an organizational entity that designs, builds, and releases software functionality within a software ecosystem.” At this level, a software developer concentrates on decisions regarding its products and services. However, their challenge is to differentiate between software development and software supply. Clear separation between these two functions makes it possible for the software developer to deliver its products in different ways, such as having a product of its own along with a service, or embedded in a hardware product, to mention a few possibilities. It also allows adjustment of the product distribution according to software ecosystem requirements. (Jansen et al. 2009b). Cusumano (2000) indicates that the success of United States based companies in creating standardized and packaged software is particularly based on separation of demand from the supply side of business.

Iansiti & Richards (2006) define a product used directly by the end customer to solve a set of problems to be an application, and the developer is an application provider. Platform providers produce and deliver platforms, which are a set of tools or components that provide building blocks for application providers. This definition is in line with the definition of Messerschmitt & Szyperski (2003). According to their definition end users of the infrastructure software are ASDs and various operators, whereas end users for the software application are the real end users, groups of end users, or organizations that share the same problem. The research at hand refers to the combination of all the preceding software and hardware developer types as suppliers. It also considers any other type of actor as a supplier if the actor delivers any kind of product or service to the focal VAR.

Kontio et al. (2005) discuss software companies and categorize them. Their view is based on a software company’s business and product types. They divide
software businesses into either product businesses or service businesses. According to their research, software products can be a tailored product, a productized product, or something between these two ends of the spectrum.

According to the definition of Kontio et al. (2005), Product licensors are companies that focus on developing and selling highly productized software products. Product integrators also have highly productized software products, but they also include services as part of their product offering. Services can include end user training or maintenance work. Solution consultants have products with a low degree of productization. They require additional customer-specific tailoring work. The productization degree of a product tailor’s product is low. Their business revenue is based on product licenses as well as on product tailoring and customer-specific projects.

In the definition of Kontio et al. (2005), the division between tailored offering and productized offering is based on how well a product can be duplicated without customer-specific work. The division between service-based business and product-based business is on the basis of how much of the company’s revenue is purely from product licenses. The business of the product licensors is clearly a software product business. Solution consultants are also a software product business because it is based on products that may not be standardized and therefore need customer-specific tailoring work. (Kontio et al. 2005).

The software company categorization of Rönkkö et al. (2007) is based on the productization level of a software product. They view share of revenue from software products as the second characteristic of their categorization. They have three categories of software product companies. A product licensor is a company that has a highly productized, off-the-shelf type of software product. A product integrator is a company that also has a productized product, but it normally sells a certain amount of service with the product. They offer consultation work as a service, but the software still forms the core of their product offering. A solution provider offers a product that consists of software that has a degree of productization or is a complicated product (i.e., ERP or CRM solutions). Every delivery consists of a software product and possibly some product customization, configuration, or even customer-specific tailoring and training. Although a large amount of revenue comes from consulting and delivery projects, the software product itself is still a core part of the customer delivery in these companies.
The previous definitions of software product companies categorize companies based on their business and product types. Software ecosystems, software value chains, and software supply networks describe the stages and their primary focus needed to deliver a working solution to customers. They need members to put them into operation. The following section discusses the members and their roles and responsibilities.

3.3 Intermediaries

Software suppliers are not the only players in the software industry. Various types of consultants, system integrators, service providers, and end user organizations also have their own important role in this business. Knight and Harland (2005) summarize the views of several researchers as follows: “actors in a network can be viewed as a collection of roles. Roles can be seen as context specific and negotiated between the role enactor and role ‘senders’.” Companies are actors, but any type of organization or even an individual can also be an actor in a network (Möller & Halinen 1999).

A new product introduction may trigger a partnership network renewal. A new product may need new marketing, sales, or technical skills, or even a new business model that the existing partnership network lacks. (McHugh 1999).

Middlemen or intermediaries are actors that have different roles in different market systems (Gadde & Snehota 2001). It is possible that an intermediary does not perform any specific tasks while still existing within a business relationship. The role of an intermediary can be more or less central or even crucial for the existence of a business relationship. This is especially true in cases where sellers and buyers do not have direct contacts with each other and an intermediary is in a position of being able to influence the character of the business relationship. (Havila 1993).

Partnership with intermediaries is common in international business (Havila 1993, Havila et al. 2004) and in B2B markets (McQuiston 2001). Package software suppliers form in some cases B2B alliances with partnering organizations to deliver more customized solutions to their customers (Sarker et al. 2012). Intermediaries have market knowledge and sales expertise. They have a distribution network to make products and services available to customers more effectively and efficiently than suppliers can (McQuiston 2001). Partnering has
been more common in recent years because of tough competition, fragmented markets (McQuiston 2001), and the complex nature of international business relationships (Havila 1993, Havila et al. 2004).

Software suppliers try to find the most suitable partners for their business (McHugh 1999). They look for quality, channel-strong, and channel-friendly partners (Himmelsbach 2003). First, the partner candidate must commit to the software supplier’s product in order to market and sell it effectively. Their current customer base should have the potential for sales of the supplier’s product. Candidates should know the market idiosyncrasies well. It should also be able to cover the geographical markets and technical requirements when considering sales and implementation activities. (McHugh 1999).

A partner agreement is always a two-way agreement. A software supplier expects commitment and sales from its partners. On the other hand, partners expect successful business to be generated by the software supplier’s product. (McHugh 1999). In a partnership, complementary skills and technologies are attractive, but to be fully utilized requires a certain amount of similarity between operations (Wilkinson et al. 2005).

Contracting parties agree about the level of commission, which may be connected to sales targets. The software supplier may require that a certain number of personnel and a specific budget amount be committed to the sales and marketing activities related to its product. Negative aspects of partner agreements are the penalties for not achieving targets and the terms for dissolving a partnership agreement. At times, there must be agreement about the terms of exclusivity. But a certain amount of caution should be used because exclusivity terms always limit the business opportunities of the software supplier. (McHugh 1999).

A good partnership relationship requires active attention from both sides. A channel partner needs adequate training, share of markets, and immediate marketing and technical support to be successful in its business. (McHugh 1999). A software supplier offers various marketing programs to their partners to train and support them (Lombardo 2005). If a software developer has a large partnership network, it may classify the partners into different classes or tiers depending on such attributes as size of the partner or its various capabilities. A software developer supports its partners based on their partnership tier ranking. (McHugh 1999). Partner certification may improve the quality of channel partner offerings to customers (Himmelsbach 2003). A software supplier should commit
its own personnel to take care of the partner relationship, to discuss potential product development and improvement needs, to review partner performance, and to set new targets (McHugh 1999).

If a software supplier wants to keep control of some of the sales activities, it may lead to conflicts with contracting parties when both parties expect to be involved in a specific sale. In these situations, the sale can be managed as a joint activity or parties may agree that the software supplier itself concentrate on bigger customers, or on certain vertical markets or industries, and the rest of the markets will be left to its partners. (McHugh 1999).

An intermediary may perform different types of tasks within a business relationship, such as carrying inventory, selling, physical distribution, after-sales service, and extending credit to customers (Stern & EL-Ansary 1992). Tasks and the intermediary’s involvement can differ depending upon the situation (Havila 1993).

3.3.1 Tasks of the Intermediary

The role of the intermediary in a marketing channel is to add value (Coughlan et al. 2001, Geersbro & Vedel 2008, Weber 2001) and reduce costs in the channel. From a customer’s perspective (i.e., from the demand side of marketing), channels are required to help customers find suitable products or services. Intermediaries build an assortment of products and services from different suppliers so that their product offering is attractive to customers. They also make products and services available to customers at a certain place and time so that they are obtainable by customers. (Coughlan et al. 2001). From the suppliers perspective (i.e., from the supply side), intermediaries ensure that products and services are reaching the right kind of customer segments. The role of the intermediary is to make marketing channel transactions (i.e., ordering, valuation, and payment) routine in order to increase the efficiency of the channel. (Coughlan et al. 2001, Weber 2001). Suppliers and intermediaries co-operate to balance inventory by sharing information. They make sure that product stock is neither under nor over stocked. That way, they both maximize savings. Intermediaries reduce a supplier’s number of contacts. Without intermediaries, a supplier needs to interact with every potential customer, which increases the costs of the marketing channel. (Coughlan et al. 2001).

In a supplier-reseller partnership, the value of the competitive advantage is created by any combination of financial, special, human, organizational, relational,
and informational resources. But the value of these resource combinations is largely determined by the sustainability of the partnership. Sustainability has many dimensions. Resources should be acquired at an efficiency-enabling price and they should be unique and not imitable. (Weber 2001).

Geersbro & Vedel (2008) have identified value functions, which are performed by the intermediary and supplier. Product functions relate to product price, quality, and time of delivery. Logistics that function together with information and risk-taking functions are traditionally considered to be functions that the intermediary has been responsible for in creating value. Logistics functions include stock keeping, assortments and delivery coordination related activities. Stock keeping is not that important in a software business. Safeguarding product guarantees, liquidity, and risk taking form the financial functions. Knowledge functions cover knowledge of product line and knowledge of supplier portfolio. The scope of administration functions is billing and purchase coordination. Indirect functions are related to market knowledge, market scouting, innovations and social functions. (Geersbro & Vedel 2008).

3.3.2 Sales Channel Actors

Sales channels actors focus mainly on selling the software supplier’s product. Sales channel actors are (1) resellers (McHugh 1999), (2) distributors (Gadde & Snehota 2001, McHugh 1999), (3) traders, (4) providers (Gadde & Snehota 2001), (5) re-publishers, (6) agents, (7) dealers and retail outlets (McHugh 1999), (8) wholesalers, (9) specialized intermediaries (Coughlan et al. 2001), and (10) trader-coordinator-integrators (Geersbro & Vedel 2008).

Resellers are a good option for conducting vertical market business, where knowledge about a certain industry or business plays a major role. Use of resellers is also a good option when going into overseas markets and to gain market share there. A reseller can be a VAR who sells its own software product as well as other software products, hardware, or related services. In that sense, a reseller is a software vendor. They may have their own software products or they may create add-ins that are functional enhancements and work on top of the software supplier’s product. In some cases, resellers even localize the software product so that it is more suitable for their home markets. (McHugh 1999).

A distributor intermediary takes care of logistic activities that may be difficult and costly for the manufacturer because of the large number of customers. A
distributor intermediary shares the economic risk, especially present in mass-manufacturing industries where manufacturing must be initiated before a customer has even ordered or bought the product. If an intermediary is a trader, it acquires products from different sources or suppliers, combines them as one product, which it offers to its customers. Both of the previously mentioned intermediary types are considered to be members of a manufacturer’s channel. (Gadde & Snehota 2001).

An intermediary as a provider is part of the customer’s supply network. It identifies customer’s needs and looks for suitable products to fulfill the need. In general, one intermediary can act in one or more roles depending on business network structure and business opportunities of the moment. (Gadde & Snehota 2001).

Re-publishers localize their software vendor’s product, but instead of selling the product under the vendor’s label, they sell it under their own label. In this sense, a re-publisher is a combination of original equipment manufacturer and reseller. (McHugh 1999). A re-publisher can be categorized as a value added partner too.

An agent’s access to the market is based on their main profession, usually different types of consultants. Agents may introduce their software supplier’s product to potential customers and leave the actual selling to the supplier. Or they might work as sales agents. An agent’s business is based on the commission they receive from the software supplier. (McHugh 1999).

Dealers and retail outlets are volume market actors. Dealers sell high volumes either directly to end customers or through a second-tier dealer network. Retail outlets target small and home offices and consumer markets. Both dealers and retail outlets mainly take orders. They offer limited deployment, installation, and setup support to their customers. Dealers concentrate on selling the software product. They do not normally add any value to the software supplier’s product. (McHugh 1999). Retailers sell directly to individual customers. Department stores, hypermarkets, franchisers, and on-line retailers are all types of retailers. Wholesalers sell product or service of the channel to other intermediaries but not to individual customers. Examples of wholesalers are merchant wholesalers, distributors, manufacturers’ representatives, agents, and brokers. (Coughlan et al. 2001).

Specialized intermediaries are typically responsible for one specific flow in the channel. It is quite common that this flow is not part of the core business itself, like insurance, financing, or logistics. (Coughlan et al. 2001). An intermediary
can also be a trader-coordinator-integrator, who coordinates logistics, integrates activities of the buyer and supplier, and is responsible for communication in the value-creation process (Geersbro & Vedel 2008).

3.3.3 Application Service Providers and Infrastructure Service Providers

A company can act as an ASP (Messerschmitt & Szyperski 2003). It offers software applications and related hardware hosting services to its customers (McHugh 1999) over the network (Xu & Brinkkemper 2007). The ASP business model is a cost savings model for both the customer, especially small and mid-sized companies, and the software vendor (Xu & Brinkkemper 2007). ISPs purchase or license and operate the hardware and software infrastructure, e.g., computers, storage, network, and operating system (Messerschmitt & Szyperski 2003).

Software as a Service (SaaS) providers bundle software and related services, like delivery and maintenance services, as a product that they offer to their customers and deliver over the Internet. Bundling is a way to differentiate one’s own products from the competitor’s corresponding products. Internet and quick development of telecommunication technologies have opened up new possibilities for offering new services. (Fan et al. 2009). Usage of SaaS products minimizes the cost of implementation, which can be quite large, especially with complex product implementation like ERP or CRM (Fan et al. 2009, Youseff et al. 2008). SaaS applications might be difficult to integrate with the customer company’s existing systems (Fan et al. 2009, Youseff et al. 2008). In addition, data privacy and security are challenging in the SaaS environment (Youseff et al. 2008).

Although customers use the software over the Internet using a SaaS provider’s IT environment, the requirements for the software performance, availability, and security are the same as using the application as shrink-wrap software on the end user’s own desktop. This forces SaaS providers to invest heavily on service capacity and processes. On the other hand, it forces customers to choose between performance and the cost of implementation. The SaaS business is a continuous balancing of operational costs and service quality improvements, i.e., they have to gain service excellence with great efficiency. (Fan et al. 2009).
3.3.4 VARs

A VAR may perform different types of activities within a business relationship, such as carrying inventory, selling, physical distribution, after-sales service and extending credit to customers (Stern & EL-Ansary 1992). Activities and the VAR’s involvement may differ depending upon the situation (Havila 1993). Activities are linked by flows of material, information, financial resources, and influence relationships. They are carried out using different types of resources. Activities may be governed by the market or by intermediary hierarchy forms of co-ordinations, i.e., company networks. (Parolini 1999).

Brinkkemper et al. (2009) state that a VAR adds its products to a software supplier’s product, whereas a Value Added Partner (VAP) adds services to a product. McHugh (1999) talks only about VARs who are responsible for providing software implementation activities. Kotler (1997: 397) takes the view that in the IT industry, VARs customize the computer hardware and software for individual clients or customer segments and earn a price premium in the process. Niu (2009: 9) has categorized VARs as strategic VARs, which are sales partners, value-added-resellers, and box-moving VARs, which are sales distributors or sales agencies.

From the VAR-company point of view, VAR business can be seen as an interesting business. It may have acceptable profit margins and sales opportunities. The supplier company may have a strong brand name. (Niu 2009). It may have strong marketing and technical support (Niu 2009), which are needed to obtain the latest and most reliable information in an efficient way (McQuiston 2001).

Software suppliers may see the VAR as their extended sales force whose main purpose is to bring in opportunities and new accounts. Suppliers want to sell directly only to their largest accounts. They look for quality, channel-strong, and channel-friendly partners. VARs need to prove their added value to both the supplier and customers. (Himmelsbach 2003). Suppliers should see VARs as complementary players because customers may value a supplier’s product more when the VAR’s product is also available than when the supplier’s product is available alone (Nalebuff & Brandenburger 1997). The main advantages of using VARs come from supply chain management, e.g., market coverage, specialization, customer contacts, and lower costs (Niu 2009). Good marketing knowledge is seen as an advantage (McQuiston 2001; Niu 2009), as it reduces selling costs and risks (Niu 2009). The possibility of increasing sales in certain business segments
and selling skills are also seen as advantages. VARs add value to the supplier company’s product and service to end customers (Niu 2009).

When viewing VARs from the end-customer’s point of view, one-stop shopping, responsive service level, reduced service and maintenance costs, and improved cultural and communication links with a VAR can be considered clear benefits (Niu 2009). VARs have to understand customer needs and requirements to provide the right kind of information about their products and product features. Product related information is available over the Internet but the reseller who provides analysis and combined information to its customer gain a competitive advantage. (McQuiston 2001).

When using VAR software, suppliers may feel that they lose control to external entities and customers. They may regard it as a disadvantage. There is always room for opportunistic behaviour and the possibility that intermediaries will extract rather than add value. In some cases, the middleman’s profit is viewed as a disadvantage, because suppliers consider intermediaries as channel parasites rather than marketing assets. They fear poor market management, inadequate communication, and that the intermediary’s objectives may conflict with theirs. (Niu 2009).

**Integrators**

In the original software ecosystems framework of Messerschmitt & Szyperski (2003: 174), system integrators are responsible for software provisioning. In the extended conceptual framework of Warsta & Seppänen (2007), they divide system integrators into two business functions: channel and system integrators (see Fig. 4).

The role of the system integrator in the software value chain is provisioning, which means that they are responsible for all activities: planning, acquiring, integrating, testing, and training of future end users (Messerschmitt & Szyperski 2003). Integrators concentrate on consulting, customization, localization, and implementation work related to the software products they represent. Their business is not based on license commissions (McHugh 1999). An integrator purchases applications from ASDs and quite often from ISDs. It integrates these software products as a single solution. A system integrator installs the solution on appropriate hardware and tests the whole system. In some cases, there is also a need to either modify existing software or to create a new piece of software to
fulfil end user requirements. It is common for the ASD to make modifications to the application software, but the system integrator can also do it, especially when the modifications or extended support is needed to enable the solutions and system integration. The system integrator’s business is based on competence in integration and provisioning work. (Messerschmitt & Szyperski 2003).

An integrator is an intermediary type. According to the definition of McHugh (1999), there are three types of integrators: system integrators, management and IT consultants, and outsourcing companies. System integrators integrate a complete solution from hardware and software components (McHugh 1999) especially in the software value chain (Messerschmitt & Szyperski 2003). They do their own software development, but only by special order or on a custom-made basis. Management and IT consultants help their customers with the software product evaluation and selection process and offer other types of consulting services. Outsourcing companies can act as authorized representatives of their actual end-user companies. In that sense, outsourcing companies can be customers of software developers. (McHugh 1999).

Integrators concentrate on delivering a complete solution to their customers. Integrators can also have a major role in a software supplier’s marketing model by acting as opinion leaders and directing their customer’s decisions in favour of a certain software supplier. Integrators are keen to make agency agreements with market leaders and it is not uncommon that they even represent software products from rival companies. (McHugh 1999).

Integrated Solution Providers

Davies et al. (2007) discuss the need for reorganization when a company is moving either from a pure manufacturing business or from a service business toward integrated solution provisioning. Based on a literature review, they categorize solution integration as vertically integrated and “group of firms” integrated. Firms that engage in vertical solution integration produce solution components and services themselves. Group of firms integration exists when an integrator co-ordinates the component and service integration, but does not necessarily produce any of them. Davies et al. (2006) suggest that solution integrators should increasingly rely on outsourced product and service components because customers now require more complex solutions, up-to-date technology, and specialized services. In addition, customers expect to have a trouble-free operating solution that creates value for their business. Solution
integrators concentrate on integration co-ordination and move their business toward a consultancy type of service (Davies et al. 2007).

Integrated solution providers combine products and systems with services to meet customer needs and create added value for their customers as well as themselves. Their involvement covers the whole solution lifecycle, starting with the design phase and lasting for the duration of the operational phase. (Brady et al. 2005). Integrated solution providers need system integration, operational services, business consultation services, and financing capabilities to be successful in the market (Brady et al. 2005, Davies et al. 2006). When thinking about system integration, integrated solution providers must be able to specify (Davies et al. 2006) design and integrate solutions for their customers (Brady et al. 2005). When selecting product and service components, solution integrators must choose between the single vendor (vertical integration) and multivendor (group of firms) approach (Brady et al. 2005, Davies et al. 2006). In some cases, they must even select product or service components from their competitor’s offerings to fulfil customer requirements (Brady et al. 2005, Foote et al. 2001). Physical components include both hardware and software components (Davies et al. 2006).

Integrated solution providers have an understanding of customer requirements and the system during the specify, design, and integration phases. On that basis, it is natural to offer maintenance (Davies et al. 2006, Davies et al. 2007), spare parts, training (Davies et al. 2006), services (Davies et al. 2007) such as fault reporting, and remote diagnostic type of operational services (Davies et al. 2006), and financial services (Davies et al. 2007) to customers. Operational service contracts may also lead to additional product and service orders. The possibility of gaining operational service contracts guides the solution design toward a reliable and easily maintained solution. (Davies et al. 2006). This is a win-win situation for both the customer and integrated solution provider.

Integrated solution providers add value by providing combinations of products and services that create unique benefits for each customer. They take over responsibility and risk by performing activities previously carried out in-house by their customers. They develop new ways for components to work together as an integrated whole, increasing the overall value of the solution for the customer. (Brady et al. 2005). Success in the business of integrated solutions is also dependent on how fast a customer’s specific solution can be standardized and reused for another customer. Not only the solution itself, but the experience
gathered during the customer-specific project should be shared and standardized for use in future customer cases. (Davies et al. 2006).

Summary

A VAR is an intermediary that adds products on top of a software supplier’s product (Brinkkemper et al. 2009), provides software product implementation activities (McHugh 1999), customization of computer hardware and software for individual clients or customer segments, and earns a premium on the original price in the process (Kotler 1997: 397). A VAR can also be a sales partner (Strategic VAR), a sales distributor, or a sales agency, i.e. box-moving VAR (Niu 2009). There is also an intermediary type called the VAP, which adds services on top of the product (Brinkkemper et al. 2009).

According to the preceding definitions of a VAR, it can be seen that the VAP and integrator businesses are very similar to a VAR. Integrators concentrate on consulting, customization, localization, implementation (McHugh 1999), and integration (Messerschmitt & Szymerski 2003) work related to the software products they represent. VARs add a product on top of a software supplier’s product. VAPs add a service on top of the product. (Brinkkemper et al. 2009). In addition to the preceding offerings, an ASP completes the businesses by offering software applications and related hardware hosting services to its customers (McHugh 1999).

As a summary, the research at hand defines VARs as intermediaries that may (1) act as sales partners, (2) integrate a complete solution from hardware and software components, (3) provide solution implementation, (4) customization services, (5) complete their own software development, (6) offer consulting services, (7) act as authorized representatives for end-user companies, (8) offer software applications and related hardware hosting services, and (9) offer various types of training.

3.4 Consultants

Consulting services have become more common. Traditional product companies included consulting services in their offering portfolio. The rationale for this is that profit margins for traditional products have decreased. Today, both consulting and maintenance are considered to be more profitable than traditional products.
Marginal costs of software product companies are almost zero. Their market share follow-up is based on sold copies of a product. In general, there are only a few big, global software product companies that compete with each other in the market. In the software service business, marginal costs are continuous because the business is selling people and expertise, not products. (Hoch et al. 2000). Services provide continuous streams of revenue. They tend to have higher margins and require fewer assets than product manufacturing. (Davies 2004). The number of companies that offer management consulting has increased during the past few years (Ploetner 2008). There are small and local companies as well as large global companies like Cap Gemini and Siemens Business Services (Hoch et al. 2000).

There are two consultant types in the software ecosystems framework of Messerschmitt & Szyperski (2003: 174), industry consultants and business consultants. The difference between the roles of system integrators and business consultants is that system integrators specialize in technical issues and business consultants concentrate more on human issues like processes and organizational needs (Messerschmitt & Szyperski 2003). Warsta & Seppänen (2007) have identified a third consultant type, customer consultants (see Fig. 4).

In the consulting business, sales and production phases cannot be separate individual organization units. Trust between customer and consultant is built during the sales phase. It is common that trust is built on a personal level and it cannot be transferred from one person to another. Building trust requires a significant amount of communication. It is common for a consulting company to send the curriculum vitaes of its consultants to customers to show the transparency of its business. (Ploetner 2008).

To be successful in provisioning work, the key is to understand the end user context, i.e., its business processes and organization structure. Business consultants are specialized in this area of work. (Messerschmitt & Szyperski 2003).

Industry consultants focus on the needs of all firms. Business consultants concentrate on solving the challenges of a particular firm using software applications. They use past implementation experience of an application (or similar type of application) when implementing the application in the focal firm. (Messerschmitt & Szyperski 2003). Business consultancy includes help and
support activities to solve operational and strategic problems, business plan development, technology selection, and business process improvement. Business consultancy ability can be developed in-house by forming a joint venture with a professional service company, or by acquiring such a company. Financing services can be offered through strategic partnership arrangements with a financing company or bank. (Davies et al. 2006).

ASDs need to consider and understand the implications the application may have on the end-user organization’s business processes and organization structure. Industry consultants could be used to expand the supplier’s competence, especially when capturing and analyzing the requirements of end user organizations. They analyze and capture the needs of various business segments and convert them into requirements for application software features and capabilities. (Messerschmitt & Szyperski 2003).

To develop infrastructure software suitable for several different types of applications, a supplier must understand a wide range of different types of applications and their needs. This is the same dilemma that industry consultants face. ISDs and industry consultants can use the same methodology to tackle this issue. They can study and interview representatives about the requirements of different domains. A thorough set of requirements attracts a wide range of ASDs and means business to industry consultants. In the same way, infrastructure software can be used as a service platform in various types of applications to attract ASDs and operators, and this means business for ISDs. (Messerschmitt & Szyperski 2003).

### 3.5 Customers

B2B markets and consumer markets are two different types of markets. B2B markets are “firms, institutions, or governments that acquire goods and services either for their own use, to incorporate into the products or services that they produce, or for resale along with other products and services to other firms, institutions, or governments” (Anderson & Narus 2004: 4). Compared with consumer goods markets, where product design is essential, capital goods market customers are more interested in the functionality and performance of a product (Anderson & Narus 2004).

In B2B markets, a small number of suppliers provide high-value goods and services (Davies A 2004) to a few large customers (Anderson & Narus 2004, Davies A 2004, Kotler 1997: 205). Suppliers offer a range of customized products
Enterprise systems are packaged software products. They are ready-made software products that are purchased from software suppliers, but generally require at minimum a little modification or customization. (Xu & Brinkkemper 2005, Xu & Brinkkemper 2007). They are B2B product software (Xu & Brinkkemper 2007) targeted to business customers (Iberle 2003), as most CoPS are (Hobday 1998).

B2B customers buy enterprise systems, including PLM systems, and are powerful customers. They are price sensitive because an enterprise system presents an expensive investment and management approval for purchasing them is difficult to obtain (Bagranoff & Brewer 2003). They also have negotiation powers, because there are several supplier candidates, especially if the customer is a big global company, the license base might represent a large sales volume for a supplier (Porter 2008).

Powerful customers can capture more value by forcing prices down, demanding better quality or more service, and generally playing suppliers against one another. Buyers are powerful if they have negotiating leverage relative to suppliers, especially if they are price sensitive, using their clout primarily to pressure price reductions. A customer group has negotiating leverage if there are few buyers, or each one purchases in volumes that are large relative to the size of a single supplier, or if buyers believe that the customer group can always find an equivalent product elsewhere. A buyer group is price sensitive if the product it purchases from the supplier represents a significant fraction of its cost structure or procurement budget. (Porter 2008).

In B2B markets, suppliers are engaged in close (Kotler 1997: 205) and long-term B2B relationships with their customers (Davies 2004). B2B customers require customer-specific after-sales services, the requirements of which may vary depending on the stage of the product lifecycle. Many services are provided during the negotiation and implementation phases, before the actual product is placed in the hands of the customer. (Davies 2004). Intensive interaction with the suppliers means added value, which is result of the more efficient, prompt, and co-ordinated access to knowledge and other kinds of resources (Wikström & Normann 1994).
In general, customers of B2B markets are geographically concentrated, which lowers selling costs. But at the same time, suppliers need to monitor regional shifts of focal industries. Buyers in B2B markets are professionals when it comes to purchasing. They follow the organization’s purchasing process and policies. Formal buying instruments, such as request for quotes and purchase contracts are used. The supplier evaluation and selection process is commonly used. Many people are involved in the purchasing process and decision-making. They present different organizational roles, including end users, influencers, and approvers. (Kotler 1997: 205–217).

Institutional market customers, like schools and hospitals, often have low budgets and a captive clientele. They are interested in suppliers that can deliver products that meet or exceed a certain minimum standard at a low price. They favour domestic companies and their purchasing process includes open bidding. (Kotler 1997: 221–223).

3.6 Partners

According to Naoum (2003), the National Economic Development Council defines partnering as “a long term commitment between two or more organisations for the purpose of achieving specific business objectives by maximizing the effectiveness of each of the participants.” There are certain typical features needed for successful partnering:

- Objectives and goals are mutually agreed upon by the parties.
- There is an inter-organizational trust between the parties.
- There are mechanisms for problem resolution.
- Continuous improvement related to benchmarking process. (Naoum 2003).

Alliances can take many forms, ranging from simple agreements with no equity ties to more formal arrangements involving equity ownership and shared managerial control over joint activities (Stuart 2000). They can also be seen as an incomplete contract between firms in the sense that detailed interactions between the allied partners can rarely be fully pre-specified (Anand & Khanna 2000).

Strategic alliances are a fast and flexible way to access complementary resources and skills that reside in other independent companies (Anand & Khanna 2000, Dyer et al. 2001, Stuart 2000), such as product design, production, marketing, or distribution (Stuart 2000). They can be signals that convey social status and recognition. Alliances with well-known partners may fortify a
company’s reputation and provide access to such resources as technological know-how and new customers. (Stuart 2000).

Strategic alliances have become an important tool for achieving a sustainable competitive advantage. Hence, the ability to form and manage them more effectively than competitors can is becoming an important source for gaining a competitive advantage. (Dyer et al. 2001). Strategic alliances add value to the benefit of partnering firms through the organizational flexibility they provide (Stuart 2000). Companies that have an excellent track record in alliances have even established dedicated function to coordinate all alliance-related activities within the organization. That way, they have been able to improve knowledge-management efforts, increase external visibility, provide internal coordination, and eliminate accountability and intervention problems. (Dyer et al. 2001).

The software ecosystems framework of Messerschmitt & Szyperski (2003: 174) does not include the partner business function, but Warsta & Seppänen (2007) have added three partner types into their framework (see Fig. 4). The types are (1) technological partner, (2) service and implementing partner, and (3) strategic partner. Alliances add more value when the alliance involves the transfer and/or pooling of technical knowledge (Stuart 2000) or production (Anand & Khanna 2000), when compared with marketing alliances (Anand & Khanna 2000, Stuart 2000).

3.7 Competitors

In general, competition is based on price discounts, new product introductions, advertising campaigns, and service improvements. High competition limits profitability in an industry. Competition based on product features, support services, delivery time, brand image, etc., is less likely to erode profitability because it improves customer value and can support higher prices. (Porter 2008). According to the definition of Bengtsson & Kock (2000) competitors are actors that produce and market the same products.

According to Bengtsson & Kock (2000), competition is the direct rivalry that develops between firms due to the dependency, which the structural conditions within the industry give rise to. In a network environment, a company has vertical relationships with its customers and partners, but it also has horizontal relationships with its competitors (Bengtsson & Kock 1999). A company can at the same time cooperate with one competitor and compete with another. It also
means that the relationships are different: the first is a cooperative relationship and the latter competitive. The most advanced relationship is a “coopetition” relationship, which is made up of a combination of cooperative and competitive aspects. (Bengtsson & Kock 2000). The simplest relationship with a competitor is coexistence and facilitates only social and information exchange (Bengtsson & Kock 1999). A third party such as a customer, can influence or even force one competitor to either establish a relationship with another competitor or change the nature of the relationship toward a more cooperative nature (Bengtsson & Kock 2000, Bengtsson & Kock 1999).

Although many companies participate in PLM markets, not many companies truly compete against each other because their focus is on a variety of different aspects of PLM. In many cases, these suppliers are partners in providing more complete solutions to the PLM market. There are only a few companies that are roughly equal in size and power. No clear industry leader exists. (CIMdata 2009). For this reason, the intensity of competition between these companies is high and it may be difficult to avoid poaching business (Porter 2008). On the other hand, PLM market growth is not slow. The automotive and aerospace industries are both at a mature stage of PLM implementation. But, growth is expected to come from CPG industries, specifically, food and beverage and pharmaceutical industries. (CIMdata 2009). Exit barriers are not that high because although PLM is a knowledge domain of its own, no specialization (for example, IT assets) is needed. Slow growth and low exit barriers lower competition intensity (Porter 2008).

3.8 Public Bodies

As with all other relationships, the relationship between the public and a company is a two-way relationship. For this reason, companies take good care of their public relations. They distribute information and communicate with the public to build goodwill. One aspect of a company’s public relationship is lobbying. A single company, or even a group of companies, cooperate and communicate with legislators and government officials to promote or defeat legislation and regulation. (Kotler 1991: 156).

Software ecosystems, as with any ecosystem, exist in an environment in which they have little or no control (van den Berk et al. 2010). Each company faces several public bodies (economic environment, media, and government). The
public is any group that has an actual or potential interest or impact on a company’s ability to achieve its objects. (Kotler 1991: 671).

Governments can take on the role as regulatory body, but they can also aid companies in doing business by providing subsidies, loans, and other forms of financial aid (van den Berk et al. 2010). Legislation affects business and its influence on business has increased lately. The purpose of legislation is to protect companies from unfair competition, to protect consumers from unfair business practices, and to protect the interests of society from unbridled business behaviour. (Kotler 1991: 160–165). Governments directly limit or even forbid entry into industries by implementing licensing requirements and restrictions on foreign investment. Government policy can heighten other market entry barriers through expansive patenting rules that protect proprietary technology from imitation, or environmental and safety regulations such that newcomers cannot readily take advantage of economies of scale. Government policies may also make market entry easier through direct subsidies or indirectly by funding basic research and making it available to all firms, new and old. (Porter 2008).

The number and power of special interest groups has increased. They have forced company management to pay attention to the rights of customers and other social groups. (Kotler 1991: 160–165). Consumer behaviour and changes in spending patterns affect companies in B2B markets. If people save a considerable proportion of their income, banks can offer loans with low interest rates to companies. (Kotler 1991: 156). Money coming from banks and from investors improves the financial health of an ecosystem if the investments are used wisely (van den Berk et al. 2010).

Legal firms help a company and its ecosystem overcome legal issues, which can come up in relationships with competition, customers, governments, etc. Consultancy firms give advice to a company and also to its ecosystem. Both legal firms and consultancy firms have a positive impact on the health of an ecosystem. (van den Berk et al. 2010).
4 Value Creation in Software Product Business

Technology development has enabled removal of information barriers between companies. Company information systems extend beyond company limits (Parolini 1999, Sharma et al. 2001). Extension of enterprise systems no longer means extension in a supply chain (i.e., from a company to its suppliers, to its distribution channel, and to its customers). It means an extension to similar or complementary companies, and in some cases, it even means an extension to competitors because they share the same customer base. That is why they can share the same database or even the same information system. (Parolini 1999). These types of partnerships add the capability of creating value and becoming more profitable (Kothandaraman & Wilson 2001). Companies are no longer competing against each other, but are members of networks that compete against other networks (Kothandaraman & Wilson 2001, Kotler 1997). Companies are part of their own context, i.e., business network (Lindgreen & Wynstra 2005, Wilkinson & Young 2002). Any development in their business may be seen as a result of the actions and reactions of a company as well as those of other companies in the network (Lindgreen & Wynstra 2005).

Value migration is an on-going process. It defines how companies have been able to improve their revenue and profits and gain market value from previously dominant companies. Value migration is not only a matter of products. It is a matter of innovative business design that allows market newcomers to capture value. (Sharma et al. 2001). Kothandaraman & Wilson (2001: 381) share the view of Sharma et al. (2001) and state that “firms that can deliver superior value in the marketplace will win the battle for the consumer or customers.” According to Long & Vickers-Koch (1995), a competitive advantage is a result of “the company’s ability to bring its capabilities and its opportunities into balance.”

Porter (1998) states that “A firm differentiates itself from its competitors if it can be unique at something that is valuable to buyers. Any activity of a value chain is a potential for uniqueness.” A well planned channel and carefully selected channel partners can offer the potential for differentiation. Close cooperation with suppliers may offer the possibility of differentiation such as concurrent engineering of a product or a component with a manufacturing firm. (Porter 1998). In a supplier-reseller partnership, the value of the competitive advantage is created by any combination of financial, special, human, organizational, relational, and informational resources. But the value of these resource combinations is largely determined by the sustainability of the
partnership. Sustainability has many dimensions, e.g., resources should be acquired at an efficiency-enabling price and they should be unique and not easily imitable. (Weber 2001).

Timing may be crucial for differentiation. A company that is the first to introduce a new product to markets differentiates itself from its competitors. In some cases, a product introduction that is late or last may also affect differentiation. Location, scale, and institutional factors among other things may be drivers of uniqueness in the market. It is not always a given that uniqueness alone will differentiate a company in a market. Differentiation happens only after customers find this uniqueness valuable to themselves. (Porter 1998).

Customers have their own value chain that defines the activities they perform. In a B2B context, differentiation requires that a company create its competitive advantage with something that is unique. A low price or even the lowest price is not necessarily enough. The competitive advantage for a buyer may, as an example, be performance improvement enabled by a supplier’s product. In most cases, differentiation is not free; it may even be expensive. (Porter 1998).

This chapter provides an overview of value, value creation, and capturing value through review of literature. The first subsection formulates a definition for value (Section 4.1). The second section gives an overview of the concept of value creation, including a review of value creation strategies, value creation systems, and value creation functions (Section 4.2). The last section discusses the concept of capturing value. It discusses software business models, their elements, and how to select a business model (Section 4.3).

4.1 Definition of Value

Porter (1998: 38) defines value as “the amount buyers are willing to pay for what a firm provides them.” Kothandaraman & Wilson (2001: 381) present a simple definition for value: “the relationship between the competing market offerings and their respective prices.”

Value can be viewed from a customer’s perspective, from a seller’s perspective, and from a business relationship perspective. A buyer’s perspective is in focus when viewing how a supplier creates superior value for its customers and how a customer sees this superior value compared to the corresponding offering of competitors. From the seller’s perspective, value creation is viewed as attracting, developing, and retaining customers. (Ulaga 2001). The business relationship perspective is in focus when value is either jointly created in business networks (Ulaga 2001) or is created in a coopetitive relationship (Bengtsson & Kock 2000). The value of a specific product may be different for different customers (Anderson & Narus 2004, van der Haar et al. 2001) when viewing value from the product usage point of view (Anderson & Narus 2004) or when viewing it over the course of time (van der Haar et al. 2001).

4.1.1 Customer Value

Customer value is not only subject to richness of product features. It is the result of total value proposition, which consists of product, related services, channel, and future ideas (van der Haar et al. 2001). Woodall (2003) argues that customer value is actually two-dimensional. It is both the value that is derived by the customer from the supplier and the value that is derived by the supplier from the customer. He calls the latter customer lifetime value and the former Value for the Customer (VC), which is the demand-side value.

Woodruff (1997: 142) presents the following definition of customer value: “Customer value is a customer’s perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer’s goals and purposes in use situations.” He believes that researcher definitions of customer value share certain topics. Value is linked to the use phase of the product. It is something that is perceived by customers, not determined by suppliers. It is a trade-off between what the customer receives and what it must give up to acquire and use a product. But there are also topics that diverge from the definitions. The terms on which definitions are built, are not well defined. Each customer will view value differently, based on their unique circumstances. Customer value is classified in various ways: functional, social, emotional, epistemic, conditional value or product value, value in use, possession value, and overall value. He argues that his definition considers the customer’s perspective according to the preceding empirical research. It combines desired and received value. It links product use
with customer experience. He argues that there is a strong link between customer value and customer satisfaction.

Ulaga & Eggert (2005) view customer value as a subjective concept and is a trade-off between benefits and sacrifices. They continue that both benefits and sacrifices can be multi-faceted and value perceptions are relative to competition. Sacrifices are material or non-material valuables in which a customer needs to invest in order to gain access to the benefits of an offering (Henneberg et al. 2005).

If value is viewed only from either the customer’s perspective or from the supplier’s perspective, value and value creation is limited to the value of the market offering. Joint value creation that is achieved through the cooperation of both the customer and supplier is discarded. Value that is realized in the future is also not covered. Value creation requires activities and competences, which the concept of mere customer value discards. (Möller 2006).

There are two value types that are special in B2B relationships, a product’s in-use-value and its redemption value. The former value refers to the utility associated with actual usage. Whereas the latter is the product’s value at the time of trade-in or end-of-life. (Sharma et al. 2001).

Customer Delivered Value

Kotler (1997) views customer value as Customer Delivered Value, which is the difference between (1) Total Customer Value and (2) Total Customer Costs. He defines Total Customer Value as “the bundle of benefits customers expect from a given product or service.” Correspondingly, he defines Total Customer Costs as “the bundle of costs customers expect to incur in evaluating, obtaining, and using the product or service.” If a supplier is at a customer delivered value disadvantage compared to its competitors, it can either increase total customer value by strengthening product, service, personnel, and image offerings or lower total customer costs by lowering price, simplifying the ordering and delivery process, or lowering customer risk by offering various warranty arrangements. (Kotler 1997: 38–40).

In general, customers buy from those suppliers they believe can offer the best value (Lindgreen & Wynstra 2005). Customers may also select a product where customer delivered value is not the highest possible because the customer may value a lower price more than the value of the offering. They see short-term
benefits of a product to be more beneficial than the corresponding long-term benefits, although the long-term benefits could have been more beneficial for the company. (Kotler 1997: 38–40).

**Customer Value in Business-to-Business Environment**

In a B2B environment, customer value can be viewed differently depending on the business process development phase. There is value gap if there is difference between the value the customer is expecting and the value the supplier is offering. (van der Haar *et al.* 2001: 630). The smaller the gap between expected value and received value, the better the chance the supplier will sell its product (Evans & Berman 2001, van der Haar *et al.* 2001).

In the beginning of the business development process, a supplier has an idea about the value it wants to offer its customers; this is the *Intended Value*. Correspondingly, customers have certain needs at this phase; this is the *Desired Value*. The gap between the supplier’s value offered and the customers’ value needs is the *Information Gap*. A supplier can decrease the gap by collecting information about the market (van der Haar *et al.* 2001, Woodruff 1997).

After the product is developed and introduced to the market, it has a *Designed Value*. As a result of technical constraints and miscommunication between marketing and product development, the product may have a different designed value than its originally intended value; this is the *Design Gap*. (van der Haar *et al.* 2001).

When a product is available on the market, customers are able to make observations about the product and its performance. Based on their observations, they form their view about the *Expected Value*. Again, expected value may differ from the desired value because the product on the market is not able to fulfil all of the customer’s requirements. This difference is the *Compromise Gap*. The *Perception Gap* is the difference between the designed value and the customer’s expected value. During the use phase, the customer evaluates the value it receives from the product. This value is called *Received Value*. If there is a difference between the customer’s expectations and what it actually gets, there is a *Satisfaction Gap*. (van der Haar *et al.* 2001). In general, the smaller the gap between expected value and received value, the better the chance the supplier will sell its product in the future (Evans & Berman 2001, van der Haar *et al.* 2001). Table 4 summarizes the customer value model of van der Haar *et al.* (2001).
Table 4. Customer value model in the business-to-business environment (van der Haar et al. 2001: 630).

<table>
<thead>
<tr>
<th>Business Development Process Phase</th>
<th>Supplier Value Offering</th>
<th>Customer Value Need</th>
<th>Value Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business development</td>
<td>Intended value</td>
<td>Desired value</td>
<td>Information gap = Intended Value – Desired Value</td>
</tr>
<tr>
<td>Purchase</td>
<td>Designed value</td>
<td>Expected value</td>
<td>Design gap = Intended value – Designed value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Compromise gap = Desired value – Expected Value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perception gap = Designed value – Expected value</td>
</tr>
<tr>
<td>Product use</td>
<td>Received value</td>
<td></td>
<td>Satisfaction gap = Expected value – Received value</td>
</tr>
</tbody>
</table>

Customer Value Hierarchy

Woodruff (1997: 142) established a hierarchy model for customer value. The model defines both desired customer value and received customer value. The lowest level of the desired customer value in the model is Desired Product Attributes and Attribute Performance, which means that the value the customer is looking for is based on product, product features, and product performance. The middle level of the model is Desired Consequences in Use Situation. It defines the value the customer expects to receive based on how they utilize the product features during the use phase. The highest level of the desired customer value is Customer’s Goals and Purposes, which means the value expectations based on how a customer is able to achieve its goals and purposes.

On the received value side of the model, there are Attribute-Based, Consequence-Based, and Goal-Based Satisfactions. A customer values the products with the same attributes or functions and performance as it uses to define the desired value. During the use phase, the received value is evaluated based on the consequences of the functions. (Woodruff 1997: 142). Table 5 summarizes the value hierarchy model from the lowest customer value to the highest value.
Table 5. Customer value hierarchy model (Woodruff 1997).

<table>
<thead>
<tr>
<th>Desired Customer Value</th>
<th>Value Source</th>
<th>Customer Satisfaction with Received Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desired product attributes and attribute performance</td>
<td>Product</td>
<td>Attribute-based satisfaction</td>
</tr>
<tr>
<td>Desired consequences in use situation</td>
<td>Product features</td>
<td>Consequence-based satisfaction</td>
</tr>
<tr>
<td>Customer’s goals and purposes</td>
<td>Product performance</td>
<td>Goal-based satisfaction</td>
</tr>
<tr>
<td></td>
<td>How well the product features can be utilized during the use phase.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How well the goals and purposes are achievable by using the product.</td>
<td></td>
</tr>
</tbody>
</table>

Summary

The research at hand summarizes customer value in a B2B environment as: (1) the difference between total customer value and total customer costs; (2) the result of the total value proposition, which consists of product, related services, channel, and future ideas; (3) the value from which both the supplier and customer form their own views during each phase of the business development process; (4) a value that may have differences, i.e., gaps when comparing the views of the supplier against the views of the customer, the views of the business development process phases, and the views of expectations against what was actually received.

Mere customer value creation is not enough for a supplier to be successful and survive in the market. A supplier customer relationship should be bidirectional where a supplier creates value for a customer while simultaneously gaining benefits from the customer. Benefits are not only monetary in nature. They could be product ideas, technologies, or even market access. That is why a supplier needs to understand how it creates value. (Walter et al. 2001).

4.1.2 Supplier Value

A supplier needs to offer value to its customers, but it simultaneously also needs to gain benefits from its customers. For the sake of its own survival, a supplier needs to understand how value can be created through relationships with customers. (Walter et al. 2001). A customer is an individual or business entity that acquires a product, service or both (legally and, probably but not necessarily, physically) and pays for it. Customers might be marketing intermediaries or
channel members like VARs who buy for resale to their customers as well as to integrate the products into their own products. (Webster 2000). The research at hand discusses supplier value as compared to supplier-perceived value, supplier-created value, and coopetitive-created value.

Supplier-Created Value

Simpson et al. (2001: 121) view value from a reseller’s point of view. They define channel relationship value as “the sum total of benefits derived from a channel partnership.” They propose a framework whereby supplier-created reseller-perceived value is determined by a chain of events that begins with the market-oriented behaviours of the supplier firm. The following list of supplier-created values is derived from their framework:

- Reduced transaction costs (negotiating, writing, and processing of each sales contract).
- Reduced negotiation time.
- Increased productivity and financial performance.
- Increased perception of added value in a channel relationship through frequent managerial contacts.
- Obstructed relationship dissatisfaction.
- Greater access to current knowledge about competitors, customers, and other constituents.
- Improved operations efficiency through forecasting and mass customization.
- Created perception that the supplying partner is more knowledgeable about, and better attuned to, the reseller’s needs.
- Developed perception of value to the reseller (the supplier appears to be truly concerned about the reseller).
- Product quality, reliability, and price/cost.
- Product profitability, line assortment, guarantee, physical design, improvements and innovations, and the market competitiveness of the product.
- Reduced direct and indirect reseller costs.
- Assured that the right products arrive to the right customers at the right place and at the right time.
- Relationship-specific investments, such as training, technical support, specialized facilities, technological interface, and territory selectivity.
Few supplier-created values can be derived from the value of manufacturers’
brands to channel members-concept of Webster (2000). We consider the
wholesaler and retailer benefits being equal to supplier-created value:

- Pre-established demand.
- Lower selling costs.
- Higher sales volume.
- Better inventory turnover and use of warehouse space.
- Manufacturer’s commitment to promote the product.
- Relationship of trust and credibility with the consumer.
- Possibly higher margins on the strongest brands.

**Supplier-Perceived Value**

The definition of supplier-perceived value includes concepts of benefits,
sacrifices and customer relationships. Supplier value is “the perceived trade-off
between multiple benefits and sacrifices gained through a customer relationship
by key decision makers in the supplier’s organisation” (Walter *et al.* 2001: 366).
Lindgreen & Wynstra (2005) point out that a customer becomes valuable to a firm
only if the firm has some value to offer to it.

Supplier-perceived value can be evaluated on the basis of the amount of
direct and indirect value functions in the relationship. Direct functions include the
activities and resources that create value regardless of other relationships. They
contribute to the profitability of a supplier (Lindgreen & Wynstra 2005) and value
is created through high profits and economies of scale (Walter *et al.* 2001).
Indirect functions “capture connected effects in the future and/or in other
relationships” (Walter *et al.* 2001). The supplier-perceived values listed below are
derived from outputs of direct and indirect value functions of a supplier-customer
relationship:

- Company performance (secured “break-even” volume, operation on a profit-
making basis, a positive cash flow, stability and control in sales).
- Technological know-how and creative ideas.
- Gaining access to new markets (i.e., new customers).
- Gaining critical market information.
- Access to third parties.
Another view of supplier-perceived value is presented by Webster (2000) when discussing the value of manufacturers’ brands to channel members. His concept includes both benefits and costs, but in the research at hand the only interest is in benefits. The manufacturer benefits are considered equal to the supplier-perceived value:

- Higher sales volume.
- Lower production costs.
- Easier introduction of new products.
- Relationship of trust with customers.
- More control over resellers.

Coopetitive-Created Value

In general, a company is assumed to cooperate with one competitor and compete with another. This means that different relationships exist with different actors. It is possible to combine cooperation and competition when managing a business relationship. If both cooperation and competition are visible in a business relationship between competitors, then the relationship is called coopetition. (Bengtsson & Kock 2000). According to Luo (2005), coopetition is the mind-set, process, or phenomenon of combining cooperation and competition. It means that companies can create a much larger and more valuable market than they could by working individually, but they continue to compete with each other to determine who gets the largest share of the market (Brandenburger & Nalebuff 1996, Nalebuff & Brandenburger 1997).

Coopetition can be defined at a dyadic business relationship level, where a relationship is a cooperation-dominated relationship if it has more cooperation than competition. If a relationship has as much cooperation as competition, it is an equal relationship. A competition-dominated relationship will have more competition than cooperation. (Bengtsson & Kock 2000). Coopetition can be defined also at strategic domain levels, which are coopetition with global rivals, coopetition with foreign governments, coopetition with alliance partners, (Luo 2004) and coopetition within a company (Rusko 2011). Coopetition with a foreign government means that two or more competing companies cooperate with each other due to, or in response to, the moves of a government. (Rusko 2011).

Creating value is a cooperative process and capturing value is a competitive process (Luo 2005). Value creation (for example R&D activities), can be carried
out in cooperation with a competitor, but the companies may prefer to compete to get a share of the market and distribute the returns of the value that has been created (Bengtsson & Kock 2000). Typical coopetitive activities are research and development, buying, and processing raw materials. Typical competition activities are distribution, services, product development, and marketing. (Walley 2007). According to Bengtsson & Kock (2000), the benefits of cooperation are:

- The costs for developing new products are divided among the cooperating companies.
- The lead times are shortened.
- Each company can contribute its core competences.
- Through competition, the competitors are forced to further develop their products and carry out their activities in the most efficient way.

Summary

Supplier value in a B2B environment as well as in the PLM systems context consists of three different value types: supplier-perceived value, supplier-created value, and coopetitive-created value. The values are created through a chain of value creation activities. In addition to the customer value and supplier value, there is also a third dimension of value, which is the business relationship value discussed in the next section.

4.1.3 Business Relationship Value

A company connects two other companies through its relationship with each of them, i.e., it has contact with both companies, but its role is different in each relationship (Håkansson & Ford 2002). The make-up of relationships in a business network is the result of the investment made by each counterpart in the relationship (Håkansson & Ford 2002, Wilkinson & Young 2002) and lifecycle stage of the relationships (Eggert et al. 2006). Strong relationships have more content than weak ones. Business relationships help a company cope with the complexity of technology development and improve a company’s offering to better meet customer requirements. (Håkansson & Ford 2002). Relationships enable access and exploitation of the resources of other parties and serve to link the parties’ activities. The distinctive capabilities of an organization are developed
through its interactions in the relationships it maintains with other parties (Håkansson & Snehota 2006).

The market is a network of buyer-seller relationships (Håkansson & Snehota 1995, Håkansson & Ford 2002). A relationship links companies (actors) with each other (Håkansson & Snehota 1995). A relationship is interdependent on other relationships in the network (Håkansson & Snehota 1995, Håkansson & Ford 2002) and is something that cannot be developed in isolation (Håkansson & Snehota 1995). Relationships are complex and long-term (Håkansson & Ford 2002). Each business relationship is special. Some business relationships are connected, i.e., a business relationship is affected by something that happens in another business relationship. Business relationships change and evolve over time. (Håkansson & Snehota 1995).

**Business Relationship**

General structural and process characteristics (Håkansson & Snehota 1995) form the inner context in which individuals interact and also form the basis for perceptions of supplier performance (Tikkanen & Alajoutsijärvi 2002). Continuity, complexity, symmetry, and informality (Håkansson & Snehota 1995: 7) are the structural characteristics considered to be typical for inter-organizational relationships (Tikkanen & Alajoutsijärvi 2002). Adaptations, cooperation and conflict, social interactions, and routinization (Håkansson & Snehota 1995: 9) are the typical process characteristics of business relationships (Tikkanen & Alajoutsijärvi 2002).

Business relationships are considered to be complex as they are comprised of several people, each with their own personal backgrounds. Business relationships are used to achieve goals, which increase their complexity. They have an aspect of symmetry; both ends of the relationships can initiate a change. Informality in business relationships is built on past experience, such as trust and confidence. From a relationship development point of view, it is more effective than formal contractual arrangements. (Håkansson & Snehota 1995).

Adaptation is a process feature of the business relationship. This means that companies at both ends of a relationship modify and adapt products exchanged, routines, and rules of conduct to function better with each other. Adaptation in administration and logistics activities is also common. Another process feature is cooperation and conflict. Each business relationship has a certain amount of
conflict. It keeps the relationship healthy. Usefulness of a business relationship is measured by cooperation and value creation. Business relationships are built on the social interaction of individuals involved in the relationship. Routinization helps deal with the complexity and informality of a business relationship. (Håkansson & Snehota 1995).

Relationships of a company form a portfolio, development and management of which may be seen as analogous to a financial investment portfolio. (Wilkinson & Young 2002). Company management is responsible for managing business relationships in such a way that it is favourable to the company itself, as well as to its important counterparts and third parties (Håkansson & Snehota 1995, Wilkinson & Young 2002). Customer decisions regarding a certain supplier naturally affect the relationship between the customer and the supplier. At the same time, it may have negative effects on relationships between the customer and other suppliers (Ford & McDowell 1999, Möller & Törnönen 2003). There is a need to decide when to invest in a certain relationship to maintain and develop it, and when to give up on an unsatisfactory relationship (Ulaga 2003).

Connected Networks

Connected networks of an individual customer-supplier relationship comprise a wider context of two focal networks in which companies and their customer relationships are embedded (Tikkanen et al. 2000, Tikkanen & Alajoutsijärvi 2002). The three basic industrial network dimensions are actors, resources, and activities (Gadde et al. 2003), i.e., the A-R-A model, where a company is a basic actor who performs activities and employs resources (Tikkanen & Alajoutsijärvi 2002). In a business relationship, companies perform activities and utilize resources to produce something unique that neither of the parties can accomplish in isolation (Håkansson & Snehota 1995).

Håkansson & Snehota (1995: 26) have identified three interactive layers in the business relationship. The activity layer consists of different types of activities (e.g., technical, administrative, commercial, etc.) that connect a company to another company while the relationship develops over time. According to their definition, activity is “a sequence of acts directed towards a purpose.” Resource ties connect the companies with resource elements (e.g., technological, material, and knowledge resources). Actor bonds is the third layer of a business relationship. It influences how the actors (companies) form their identities inside the network and what kind of picture they form of each other.
Relationships with customers, suppliers, and other organizations represent strategic (Gadde et al. 2003) and important resources for a company (Gadde et al. 2003, Håkansson & Snehota 1995). They can be used in conjunction with other resources of a company (Håkansson & Snehota 1995). Every relationship is a bridge between two actors and also a reflector or a projection of these connected relationships and their inherent resources. A relationship combines the physical and organizational resources of a company with those of its counterparts. (Gadde et al. 2003).

Industry-Level Networks

The outer context is an “industry-level” (Tikkanen et al. 2000) extension of connected networks. They are directly relevant to a customer-supplier relationship and its inner context. They are also value-creating systems. (Tikkanen & Alajoutsijärvi 2002).

The context of a company both constrains and empowers the company’s business. There are interdependencies (e.g., technological, knowledge, social relations, etc.) in a company’s operations environment. Technological connections between companies are strong. Technological development seems to have effects not only on those parties doing the actual development, but also on third parties. Company know-how is a combination of the knowledge of a company’s personnel and that of the companies that form the business network. A company’s personnel interact in a business relationship on behalf of a company and in this way form the social relations in a business network. Administrative routines and systems and information sharing are integral parts of a business relationship. Although business relationships are often informal in nature, there are always certain legal interdependencies involved. (Håkansson & Snehota 1995).

Learning new things can initialize a change in a business relationship. Different and contrasting perceptions of the activity links are also a source for change. The third source for change is the fact that actors are constantly looking for new opportunities to improve their position in the network. External network conditions (e.g., general economic conditions or new technology developed in another network) can also generate a change. (Håkansson & Snehota 1995).
In general, relationship value is evaluated in the historical context of the focal relationship, other relationships, and expectations for the future (Biggemann & Buttle 2005). In the three-way supplier–intermediary–customer relationship, the quality of the relationship for any given actor will depend on the quality and strength of the relationship between the other two actors (Webster 2000). Ford & McDowell (1999) argue that actions in a business relationship have intended and foreseen effects, but they may also have other effects. Participants of the relationship may value these effects negatively or positively.

In relational value creation, the totality of supplier benefits is dependent on the knowledge and competence gap between the customer and the supplier. The bigger the gap, the more the customer is dependent on the supplier, and vice versa. Although relational value creation is based on the relationship between two parties, it is always in danger of imitation. The more transparent the value creation is, the easier it is for other actors to copy. (Möller 2006). Möller (2006) states that the value model of Henneberg et al. (2005) manages to make a distinction between the one-sided exchange perspective and the dyadic relational view of value. It is a supplier’s responsibility to understand how to create and deliver value in a B2B relationship (Ulaga 2003).

Walter et al. (2001: 373) use the number of direct and indirect value-creating functions of a supplier-customer relationship as the basis for grouping customer relationships. A low-performing relationship does not have a clear pattern of functions yet, but it may have good potential for establishing them in the future. Some relationships are always low-performing relationships. There are reasons other than profitability or success for their existence. A selling relationship has only a high number of direct functions. A supplier receives benefits from the potential for selling large quantities, a profitable price, and over-capacities. In networking relationships, a supplier collects information from its customers and tries to turn the information into value that can be used elsewhere in the business network. High-performing relationships create high value for the supplier. Large varieties of both direct and indirect value-creating functions are in use. Over the course of time, an existing relationship may degenerate from a high-performing relationship to a low-performing relationship, but there is always the possibility for improving value creation within a relationship. (Walter et al. 2001).

Relationship value can be viewed at different levels. At the in-the-relationship level, effects of actions are immediate (Ford & McDowell 1999) and received
value has direct benefits and costs (Möller & Törrönen 2003). Actions in the on-the-relationship level affect the relationship (Ford & McDowell 1999) and value is based on learning and adaptation (Möller & Törrönen 2003). The third level is the relationship portfolio level, where actions affect the entire relationship portfolio (Ford & McDowell 1999). The relationship portfolio may be seen as the sum of cost and benefits of individual relationships (Wilkinson & Young 2002). The nature of this value creation level is future oriented, meaning radical innovations that open new business opportunities (Möller & Törrönen 2003). Ford & McDowell (1999) use new technology development as an example of this level of action and its created value. If a supplier makes a decision to develop a new technology, it may evolve into an industry standard over the course of time.

The highest level is the network level where decisions and actions regarding a relationship have their effect on the network to which the member decision-maker belongs. The effects may not be realized immediately, but will be in the future (Ford & McDowell 1999). Table 6 summarizes the preceding discussion about the effects of relationship actions, the nature of the value, and value creation.

Table 6. Relationship action effects, nature of value (Ford & McDowell 1999), and nature of value creation (Möller & Törrönen 2003).

<table>
<thead>
<tr>
<th>Relation Action Level</th>
<th>Nature of Value</th>
<th>Nature of Value Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-the-relationship</td>
<td>Immediate.</td>
<td>Core-Value production</td>
</tr>
<tr>
<td></td>
<td>Relatively transparent.</td>
<td>Transaction value, i.e., direct benefits and costs.</td>
</tr>
<tr>
<td></td>
<td>Often calculable in monetary terms.</td>
<td>Generative value, where the basis value is in learning and adaptation.</td>
</tr>
<tr>
<td>On-the-relationship</td>
<td>Changes the state of the relationship between the companies.</td>
<td>Value production</td>
</tr>
<tr>
<td>Relationship portfolio</td>
<td>Changes in the relationship portfolio.</td>
<td>Future-oriented value production.</td>
</tr>
<tr>
<td>Network</td>
<td>Change in the business network.</td>
<td>Future-oriented value production.</td>
</tr>
</tbody>
</table>

The Total Relationship Value (TRV) concept states that value is context dependent. When individuals assign value to relationships based on their personal values and interpretation of events, the value can be regarded as a personal value. Personal value is connected to non-economic satisfaction. Customer retention or referrals in a relationship are indications of the existence of personal values in a business relationship. Financial value is connected to economic satisfaction of a relationship. Its indicator is increased efficiency, a larger share of business and markets, and customer willingness to pay more. Strategic value exists if
companies improve their competitiveness as a result of the relationships in which they are engaged. It is a result of increased stability and decreased uncertainty that relationships provide to the parties involved, thus enabling them to extend the time horizon for planning, which allows better planning, reduces risks, makes better utilization of the assets possible, and provides a foundation on which the business can be built. Generating new ideas, sharing more detailed information, or gaining market intelligence to better respond to demands are outcomes of a relationship that represent knowledge value. (Biggemann & Buttle 2005). Table 7 aggregates value dimensions and operational variables of TRV.

Table 7. Total Relationship Value (TRV) (Biggemann & Buttle 2005).

<table>
<thead>
<tr>
<th>Value Dimension</th>
<th>Satisfaction</th>
<th>Operational Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal value</td>
<td>Non-economic satisfaction</td>
<td>Customer retention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referral</td>
</tr>
<tr>
<td>Financial value</td>
<td>Economic satisfaction</td>
<td>Efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Share of business</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Share of market</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Willingness to pay more</td>
</tr>
<tr>
<td>Knowledge value</td>
<td></td>
<td>Market intelligence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Idea-generation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Innovation</td>
</tr>
<tr>
<td>Strategic value</td>
<td>Increased stability</td>
<td>Long-term planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extended network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utilization of assets</td>
</tr>
</tbody>
</table>

Ulaga (2003) views value creation from the manufacturer-supplier relationship context. He lists relationship value drivers and corresponding dimensions, which Ulaga & Eggert (2005) further categorize as benefits and scarifies, which form the core dimensions of the relationship value. They propose that there is a need to add contextual dimensions that consist of such variables as type of industry, nature of the relationship, and category of the focal product or service. Ulaga & Eggert (2006) add the concept of three sources of value creation, and group benefits and costs according to these sources (see Table 8).
Table 8. Value drivers in the supplier relationship (Ulaga & Eggert 2006).

<table>
<thead>
<tr>
<th>Source of Value Creation</th>
<th>Relationship Value Benefit</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core offering</td>
<td>Product quality</td>
<td>Product performance and reliability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meeting customer’s technical specifications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consistent quality level over time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continuous improvements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Differentiated among suppliers</td>
</tr>
<tr>
<td>Delivery performance</td>
<td>On-time delivery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery flexibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery accuracy</td>
<td></td>
</tr>
<tr>
<td>Sourcing process</td>
<td>Service support</td>
<td>Capacity to provide value-added services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplier’s responsiveness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outsourcing of service activities to supplier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capable of delivering integrated systems</td>
</tr>
<tr>
<td>Personal interaction</td>
<td>Improved problem solving and communication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understanding of each partner’s goals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Key contact personnel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal interactions at all organization levels</td>
<td></td>
</tr>
<tr>
<td>Customer operations</td>
<td>Supplier know-how</td>
<td>New sourcing alternatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improvement of existing products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Early involvement in new product development</td>
</tr>
<tr>
<td>Time-to-market improvement</td>
<td>Acceleration of design work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Developing prototypes faster</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speeding up the testing and validation process</td>
<td></td>
</tr>
</tbody>
</table>

McQuiston (2001) discusses value in the relationships between manufacturers’ representatives and their principals. He views values that are inter-organizational in nature as core values. These values exist collectively between the two organizational entities, rather than between individuals. Core values and their short descriptions are listed below (see Table 9). All core values are equally important to the success of the relationship as well as sharing common themes and practices between them.
Table 9. Core values of relationships between manufacturers’ representatives and their principals (McQuiston 2001).

<table>
<thead>
<tr>
<th>Core Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared goals and objectives</td>
<td>To communicate the goals and objectives of one party to the other party.</td>
</tr>
<tr>
<td>Mutual dependence</td>
<td>One party cannot achieve its objective without the cooperation and participation of the other party.</td>
</tr>
<tr>
<td>Open lines of communication</td>
<td>To supply information and the way of supplying it.</td>
</tr>
<tr>
<td>Mutual commitment to customer satisfaction</td>
<td>Both parties in the relationship must ensure the needs of the final customer are paramount and that actions are taken to meet those needs.</td>
</tr>
<tr>
<td>Concern for the other’s profitability</td>
<td>Mere profitability and commissions are not enough for a successful relationship, but sharing risks, cost-cutting, and investments should be equal.</td>
</tr>
<tr>
<td>Trust</td>
<td>A cornerstone for establishing and maintaining a successful relationship between the parties.</td>
</tr>
</tbody>
</table>

Other values that have not been mentioned are often deemed as core values in the context of a successful relationship, but they are mentioned often enough to be included in the conceptual model of the value of a relationship. These values are supporting factors. They tend to be interpersonal in nature, which means that they exist between individuals. The supporting factors and a short description of each are listed in the table below (see Table 10). (McQuiston 2001).

Table 10. Supporting factors of relationships between manufacturers’ representatives and their principals (McQuiston 2001).

<table>
<thead>
<tr>
<th>Supporting Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment of effort by top management</td>
<td>Top management has a willingness to take a “hands-on” approach and make a concerted effort to work with the other party to install and maintain core values.</td>
</tr>
<tr>
<td>Continuous improvement over time</td>
<td>The initiative taken to move the relationship forward.</td>
</tr>
<tr>
<td>Having professional respect</td>
<td>Each party truly admires what the other party could accomplish with their products, people, or customers, and does not hesitate to let that respect show.</td>
</tr>
<tr>
<td>Developing a personal relationship</td>
<td>A successful business relationship requires not only good business relationships, but also good personal relationships.</td>
</tr>
</tbody>
</table>

Eggett et al. (2006) argue that the relationship lifecycle between various value-creating sources and overall relationship value has a moderating effect on the relationship lifecycle in the assessment of value perceptions. Relationships are
characterized by strong growth in the build-up phase, they experience minimal growth in the maturity phase, and finally shrink in the decline phase. A supplier’s potential for superior value creation in the customer’s sourcing process is strongest in the early stages of the relationship lifecycle. Business customers perceive a stronger need for personal interaction and service support in the sourcing process during the build-up phase. Know-how transfer and time-to-market explain more variance as the relationship moves through its lifecycle because customers need experience dealing with suppliers to fully understand and assess their value creating potential. The relationship lifecycle does not affect the role of a supplier’s value creation through the core offering. Customers value a supplier’s product quality and delivery performance independently from the relationship lifecycle phase. Relationships may experience a second growth phase; for example, as a result of the introduction of a new product or service.

The relationship value is summarized as being context dependent. It is different in a personal context than in a financial context. Relationship value is different again in a strategic or knowledge context. It is dependent on the level of the relationship; whether a relationship is merely a relationship between companies, part of a relationship portfolio, or a network level relationship. Relationship value is dependent on the lifecycle stage of the relationship. Relationship value can be dyadic in nature, where it can be proprietary value and relational value exchange.

Mere core value creation can be evaluated against cost and benefit, but the more complex value creation is, the more problematic supplier value creation evaluation becomes (Möller & Törrönen 2003, Törrönen & Möller 2003). As the complexity of value creation increases, the complexity of the supplier-customer interface also increases. Also, competence requirements are more challenging when moving from core value creation toward future value creation. (Möller 2006).

4.2 Concept of Value Creation

Value creation is not quite enough. It must be communicated effectively, especially in B2B markets. (Sharma et al. 2001). Törrönen & Möller (2003) propose that customers should use a supplier’s capability profile to ease evaluation of the supplier value-creation potential.
Sharma et al. (2001: 394) propose that value creation is a process that consists of technology delivery process, product delivery process, and customer delivery process. Value is created when new technology moves from research and development to the product development process. The product delivery process creates value through product development and delivery activities, which all try to ensure that the product meets customer requirements as well as internal quality, cost, delivery, and speed-to-market requirements. Companies try to maximize value creation and customer relationship strength by delivering customer-specific products and services. The customer delivery process creates value through supply-chain management, covering sales, fulfilment, and product service. Another way to add value is to become a customer expert and in that way provide better products and service to customers. (Sharma et al. 2001).

Möller & Törrönen (2003: 113) suggest that value production could be described through a continuum that simultaneously expresses the level of complexity involved and the time horizon of the value realization. Their model of core-value production presents current and low relational complexity, which does not need any major adaptation of actors or the creation of new resources. Product and service offering are closely similar to the competitors’ offering. In the centre of the model is Value-Adding Relational Value Production, where supplier and customer in cooperation develop a new product, service, or process solution. (Möller & Törrönen 2003). The value added is incremental in relatively well-established relationships. It enables functional and economic value estimations. (Möller 2006). The new product, service, or process solution is more effective than the existing one. They could also improve the efficiency of the supplier-buyer relationship. The most complex type of value production is future-oriented value production. It is related to radical innovations realized in the future. (Möller & Törrönen 2003).

4.2.1 Value Creation Strategies

Each company has its own value creation strategy. In order to develop an effective marketing or purchasing strategy (Möller 2006), optimize activities and processes, (Henneberg et al. 2005) and identify the competences involved, a company must recognize the value creation strategies of its counterparts (Henneberg et al. 2005, Möller 2006). A company should have a strategy for every relationship in its value net (Nalebuff & Brandenburger 1997). Möller
(2006) identifies value strategy types and Henneberg et al. (2005) discuss value strategy types in the context of key relationship programs.

Möller (2006) names value strategy types and they are listed in Table 11. A core value-strategy creates value through improvements in cost and delivery efficiency as well as in product quality achieved by business process improvements. In value-added strategies the supplier, customer, or customer and supplier in cooperation, develop new features for a product as added VC. If a supplier follows the value-added strategy and creates new feature offerings for its product, it must make sure that customers have the required competence to utilize the new features and gain value from them, otherwise there is a risk of losing the customer. There are alternatives for lowering the risk of losing a customer. A supplier can always try to develop features that are easy to use and do not require any additional competence. The other alternative is to offer extra services to assist a customer with its use of the new features. If the customer chooses to follow a value-adding strategy, it can pass the requirements of new product features on to the supplier. If a supplier either does not have the required competence to develop the features, or it is not willing to cooperate with the customer, a customer can always look for a new supplier who is more willing to cooperate and add value for the customer. A joint value-adding strategy is applicable if there is a need or desire to develop new complex features or value offering. (Möller 2006).

In a future-oriented value strategy, the supplier, customer, or supplier and customer in cooperation, drive for a new complex product, technology, or process innovation, which in some cases can develop further into an industry standard. As examples, Microsoft’s DOS operating system and Psion’s Simian mobile phone system. Both companies began as rather small, but innovative suppliers. They had the competence to assure customers that they were capable of creating something new and innovative and this created value for customers. (Möller 2006). As in the case of value-added strategies, a customer can also be a driver of the future-oriented value strategy. Möller (2006) gives two examples: IKEA and Amazon.com. Both developed a new business model and new business process to create value for their customers and then laid out certain requirements for its own suppliers. If future-oriented value creation is a joint effort of both supplier and customer, it is common that the value creation influence will be horizontal, affecting other actors, as it was when Ericsson and Nokia developed the Bluetooth standard.
Table 11. Value creation strategy types and their characteristics (Möller 2006).

<table>
<thead>
<tr>
<th>Value Creation Strategy Type</th>
<th>Characteristics</th>
<th>Value Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core value strategy</td>
<td>Mature market. Customer has competence to use the product.</td>
<td>Based on improvements in cost and delivery efficiency and product quality achieved by business process improvements.</td>
</tr>
<tr>
<td></td>
<td>Supplier can match its product offering with competing competitor’s offering.</td>
<td></td>
</tr>
<tr>
<td>Value-added strategy</td>
<td>Involves genuine competence transfer through interpersonal learning that requires a trust relationship between the buyer and supplier. Is applicable when developing new complex features or value offering.</td>
<td>Supplier, customer, customer and supplier in cooperation, or 3rd party develops new features for a product, which adds VC.</td>
</tr>
<tr>
<td>Future-oriented value strategy</td>
<td>Complex networking capabilities, including visioning and sense making of the emerging new value-system, creating an attractive and credible development agenda, and mobilizing and coordinating a business network that is able to develop and commercialize the new innovative offering.</td>
<td>Supplier, customer, or supplier and customer in cooperation are drivers for a new complex product, technology, or process innovation, which in some cases can develop as an industry standard.</td>
</tr>
</tbody>
</table>

Henneberg et al. (2005) view value creation strategies from the key relationship point of view. They base the value exchanges on key relationship programs, which includes Key Account Management (KAM) and Key Buying Centre (KBC). Key relationship programs are “a specific exchange between two companies that both perceived a mutual exchange as ‘strategically important’... and that both consequently organise themselves in a KAM and a KBC respectively with regard of exchanges between the two companies.” They differentiate between dynamic and static elements of key relationship value strategies. Dynamic elements of value strategy evolve when parties of the relationship have different value strategies. This means that there is a value expectation mismatch between the parties. Such a situation requires relationship management activities that may include negotiations to synchronize the expectations. There are cases when a relationship with a value expectation mismatch is not viable.
Internal, exchange, and rational value strategies are static elements of key relationship value strategies. If a key relationship structure has been created only for internal efficiency and effectiveness, the company has an *internal value strategy*. This means that both parties of the relationship consider value as direct, immediate, and a natural part of the activities. In an *exchange value strategy*, value highlights the exchange value of the relationship. A *relational value strategy* is based on a deep relationship and cooperation between the relationship parties. (Henneberg *et al.* 2005).

### 4.2.2 Value Creation Systems

Parolini (1999: 62) defines Value Creation Systems (VCS) as a “*set of activities, which creates value for customers.*” Material, information, and financial resource flows and influence relationships link the activities. The activities are carried out using different types of resources. VCS includes consumption activities insofar as the value that the final customer enjoys is also a function of the way they use and consume the potential value received. Final customers not only receive and consume the created value, but can also participate in value-creating activities. The market or hierarchical forms of intermediaries of co-ordinators (i.e., company networks) may govern activities. Various economic players may participate in a VCS (e.g., companies, families, public bodies, and non-profit organizations) by taking responsibility for one or more activities. One economic player may participate in more than one VCS. Parolini also introduces the concept of value net, which is a tool for analyzing value-creating systems. Value net is a complete map of a company’s business relationships. It is a prompt to assist in understanding the business from the outside in. (Nalebuff & Brandenburger 1997).

Kothandaraman & Wilson (2001: 384) define a value-creating network model with the goal of creating superior customer value. Core capabilities of the network members affect the value created. The influence level is defined by the relationships of the network members. According to Helander *et al.* (2002), the definitions of Parolini (1999: 62) and Kothandaraman & Wilson (2001: 384) are compatible.

Porter (1998: 38) introduces the concept of a value chain. According to his definition, value chain “*displays total value, and consists of value activities and margin. Value activities are the physically and technologically distinct activities a firm performs. Margin is the difference between total value and the collective cost*”
of performing the value activities”. A value chain is a collection of value activities connected to each other with linkages. “Linkages are relationships between the way one activity is performed and the cost or performance of another activity. Linkages are tradeoffs among activities to achieve the same overall result. They may also reflect the need to coordinate activities.” Optimization and coordination can lead to a competitive advantage. Linkages do not only exist inside one company. Linkages connect activities between a company and its suppliers or a company and its channel partners. Linkages are called vertical linkages. Commonly, they are win-win linkages, which means that optimization of value activities benefit both parties. Kotler (1997: 44–46) shares the view of the importance of a company value chain with Porter (1998). He also highlights the importance of a value-delivery network, which is a value chain of the company’s suppliers, distributors, and customers. He argues in favour of marketing networks instead of companies competing against each other.

A value chain is influenced by the competitive scope of a company. Segment scope defines product variations and customer segments. Vertical scope defines those activities that are performed internally and those that are outsourced to suppliers, partners, or even to customers. Geographical scope defines the range of regions or countries in which the company operates. Industry scope defines those industries that are within the segment scope. Different scopes enable a company to achieve different types of competitive advantages. Companies that concentrate on segment scope have the intention of designing a segment-specific value chain. They can share value chains between segments. If a company has a geographic scope, it may centralize product development and manufacturing activities within a certain country, but have distributed country- or region-based sales and service activities. In the same way, a company with an industry scope may have industry-specific product development, but shared sales and logistics activities. (Porter 1998).

Gadde et al. (2003) argue that the value chain model of Porter (1998) provides too narrow a view because few companies are involved in only one value chain. The value chain analysis of Porter (1998) is based on identifying relevant value activities. A value activity should have its own economics, not just those common to other activities. It should have a high potential impact differentiation, or it should represent a significant or growing proportion of the costs. Parolini (1999: 87–88) also criticizes the model of Porter (1998) by saying that this type of traditional model lacks an overall view of the set of activities leading to the creation of value because its focus is on an individual firm. She
continues that the model results in difficulties in cases where the economic player does not entirely undertake a sequential block of activities. She also points out that focus on companies leads to the classification of activities on the basis of their position in the value chain of individual firms, rather than on the basis of their economic structure and their contribution toward the creation of value for the final user.

Evans & Berman (2001) view that value chain from a B2B context that has two components, a value chain and a value delivery chain. A value chain is based on activities related to product planning, product quality, customer service, lead times, warehousing, etc. It also includes communication activities. A value delivery chain includes all parties that provide value. It is performer based and covers the parties that create value, their relationships, and the activities that are performed by each party. They introduce the concept of company tiers. The first tier companies are those that directly interact with the customer. The third tier companies are those that are two levels away from the customer, for example, raw material providers. (Evans & Berman 2001).

Establishing a value delivery chain requires careful planning. The role and responsibilities should be clearly allocated and, if possible, in a way that the strengths and weaknesses of each member have been taken into account. Information sharing between the members should be effective. A company that is a member of any value delivery chain should make sure that the delivery value chain provides the value the customer is expecting at a price the customer is willing to pay. Customer satisfaction and the value delivery chain performance require continuous monitoring. If any gaps are identified, corrective actions should be planned and taken. (Evans & Berman 2001).

Möller (2006: 917) has modified The Relational Value Spectrum model of Möller & Törrönen (2003: 113) by adding value system types to the model. If value creation is Core-Value Production, the value systems are fairly stable. Value activities are well known and specified. Both actors and processes are well known. These systems are characterized as being at a “high level of determination of the value system. Incrementally changing value systems” are used in “value-adding relational value production.” These systems add value through local and incremental modification within the existing value system. The added value is accomplished incrementally in relatively established relationships. Functional and economic value estimations are still rather good. The most complex value production type is future-oriented value production. Corresponding value systems
are characterized as being at a low level of determination of the value system, which means radical changes to old value systems. Emerging value systems suggest a dynamic and complex learning process and inter-organizational relationship formation that cannot be specified in advance. Old and new actors are active side-by-side. There is also a need for new value activities. As this type of value is realized in the future, its creation carries a high risk, but on the other hand, it has the potential for high revenue. (Möller 2006).

**Summary**

The PLM systems supply network is valued as a value creation system, which is a set of activities that creates value for customers (Parolini 1999: 62). In a B2B context, a supply network part of software supply network can be consider as part of a value chain that includes activities related to product planning, product quality, customer service, lead times, warehousing, and communication activities. Respectively, a delivery network of a software supply network corresponds to the value delivery chain of a value chain. It is performer based and covers the parties that create value, their relationships, and the activities performed by each party. (Evans & Berman 2001).

Earlier we defined PLM systems context as an IT ecosystem, which is a network of organizations that drives the delivery of information technology PLM systems and related services (Iansiti & Richards 2006). PLM systems supply network can be considered as operational level definition of PLM systems context. In that sence value creation system can be considered to be an operational level expression of an ecosystem.

### 4.2.3 Value Creation Functions

Value is created through activities linked by the flow of material, information, financial resources, and influence relationships. They are carried out using different types of resources. (Parolini 1999). The following sections look at the different value creation concepts found in the literature.

**Value Chain Concept**

In the value chain concept of Porter (1998: 38), value activities are divided into two categories. *Primary activities* are directly involved in physical creation, sales,
logistics, and after-market product sales; *support activities* support the primary activities. Table 12 lists these activities and gives a short description of each of the activities.

<table>
<thead>
<tr>
<th>Value Activity</th>
<th>Activity Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inbound</td>
<td>X</td>
<td>Includes receiving, storing, inventory control, transportation scheduling.</td>
</tr>
<tr>
<td>Operations</td>
<td>X</td>
<td>Includes machining, packaging, assembly, equipment maintenance, testing, and all other value-creating activities that transform the inputs into final product.</td>
</tr>
<tr>
<td>Outbound logistics</td>
<td>X</td>
<td>The activities required to get the finished product to the customers: warehousing, order fulfillment, transportation, and distribution management.</td>
</tr>
<tr>
<td>Marketing and sales</td>
<td>X</td>
<td>The activities associated with getting buyers to purchase the product including channel selection, advertising, promotion, selling, pricing, retail management, etc.</td>
</tr>
<tr>
<td>Service</td>
<td>X</td>
<td>The activities that maintain and enhance the product’s value, including customer support, repair services, installation, training, spare parts management, upgrading, etc.</td>
</tr>
<tr>
<td>Procurement</td>
<td>X</td>
<td>Procurement of raw materials, servicing, spare parts, buildings, machines, etc.</td>
</tr>
<tr>
<td>Technology development</td>
<td>X</td>
<td>Includes technology development to support the value chain activities, such as R&amp;D, process automation, design, and redesign.</td>
</tr>
<tr>
<td>Human resource management</td>
<td>X</td>
<td>The activities associated with recruiting, development (education), retention and compensation of employees.</td>
</tr>
<tr>
<td>Firm infrastructure</td>
<td>X</td>
<td>General management, planning management, legal, finance, accounting, public affairs, quality management.</td>
</tr>
</tbody>
</table>

Parolini (1999) argues in favour of models that concentrate on individual firms, like the model of Porter (1998), and do not allow an overall view of the set of activities leading to the creation of value. She proposes an activity classification
based on economic structure and contribution to the value creation for the purchaser, without being affected by the make or buy decisions of the economic players involved. This classification is presented in the next section.

**Value Creation Systems**

In the Value Creation Systems (VCS) model, there are three groups of activities: (1) *realization activities* are aimed at the physical creation of goods and their transfer in time and space, (2) *support activities* are aimed at maintaining or improving the effectiveness and efficiency of other activities and do not intervene in the physical production of individual products and services, and (3) *external transactions management activities* are aimed at managing and controlling the transactions arising in the presence of exchanges between distinct economic players. The difference between realization activities and support activities is that realization activities are carried out every time an additional unit of product or service is supplied, but support activities are carried out relatively independently from the supply of the product or service. Support activities can support individual activities, individual companies, and the system as a whole, where the system can be a company or even the whole VCS. The VCS model also includes *consumption* activities, because VCSs are defined on the basis of how consumption activities are carried out. (Parolini 1999). Table 13 lists the realizations, support, and external transactions management of VCS. Parolini (1999) provides a generic description and even practical examples of activities. That is why we do not provide any additional information or description of activities. Operations and warehousing activities are not relevant in a software product business.

**Table 13. Realization, support, and external transaction management activities of value net (Parolini 1999: 89).**

<table>
<thead>
<tr>
<th>Value Net Activity</th>
<th>Activity Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>X</td>
<td>Physical supply of products and services with given configuration, in a certain place and at a specific time.</td>
</tr>
<tr>
<td>Quality control</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Value Net Activity</td>
<td>Activity Classification</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Realization</td>
<td>Support</td>
<td>External Transactions Management</td>
</tr>
<tr>
<td>Walrehousing</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pre-sales customer services</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Additional services</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Post-sales assistance and services</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>New product development</td>
<td>X</td>
<td>Research, development, and design of new products.</td>
</tr>
<tr>
<td>New process development</td>
<td>X</td>
<td>Research, development, and design of new processes.</td>
</tr>
<tr>
<td>I.S. management and development</td>
<td>X</td>
<td>Development of information systems.</td>
</tr>
<tr>
<td>Database management and development</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Human resource management</td>
<td>X</td>
<td>Organization, training, and control of personnel.</td>
</tr>
<tr>
<td>Procurement policies</td>
<td>X</td>
<td>Definition of procurement policies.</td>
</tr>
<tr>
<td>Marketing</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Infrastructure activities</td>
<td>X</td>
<td>Internal administration, finance, legal affairs, management of relationships</td>
</tr>
<tr>
<td>with public bodies, planning</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Purchases</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Drawing up of contracts</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

An important contribution to company success can come from customer relationships. A supplier needs to offer value to the customer, but also needs to gain benefits from the customer at the same time. To secure the long-term survival of the relationship, both parties must understand the value-creating functions within the relationship. (Walter et al. 2001). The next section reviews the concept of value creation in business relationships.

**Value Creation Functions of Customer Relationship**

Walter *et al.* (2001: 369) take supplier’s view in their research of value creation. They introduce the concepts of *direct* and *indirect functions* when studying how
the supplier-customer relationship creates value for the supplier. A supplier-customer relationship may utilize more than one direct or indirect function, or any combination of functions. In a relationship, an indirect function may be as, or even more, important than a direct function. (Lindgreen & Wynstra 2005).

In their framework, direct functions include those activities and resources of both supplier and customer that can create value regardless of other relationships. Direct functions contribute to the profitability of a supplier (Lindgreen & Wynstra 2005). Indirect functions “capture connected effects in the future and/or in other relationships.” When discussing indirect functions, Walter et al. (2001) take into account supplier-customer relationships as well as other relationships of the whole business network. Indirect functions have a positive impact on the exchange in other relationships (Lindgreen & Wynstra 2005). Functions of a customer relationship with short descriptions are listed in Table 14.

Table 14. Direct and indirect functions of customer relationships (Walter et al. 2001).

<table>
<thead>
<tr>
<th>Customer Relationship Function</th>
<th>Function Division</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit</td>
<td>X</td>
<td>Supplier must have profitable customer relationships if it wants to survive in the long term (Lindgreen &amp; Wynstra 2005).</td>
</tr>
<tr>
<td>Volume</td>
<td>X</td>
<td>Supplier makes concessions in prices to handle customers who purchase comparatively large portions of the supplier’s production (Lindgreen &amp; Wynstra 2005).</td>
</tr>
<tr>
<td>Safeguard</td>
<td>X</td>
<td>Improves the cost-efficiency of the supplier. Given the uncertainties in competitive markets, suppliers establish certain customer relationships that are held as insurance (Lindgreen &amp; Wynstra 2005).</td>
</tr>
<tr>
<td>Innovation</td>
<td>X</td>
<td>Supplier establishes relationships with customers who are seen to be at the forefront of technology or whose product expertise is high (Lindgreen &amp; Wynstra 2005).</td>
</tr>
<tr>
<td>Market</td>
<td>X</td>
<td>Large and prestigious customers are known to apply stringent criteria to their selection of supplier companies may have a valuable reference effect even though they are not the first customers in a certain market (Lindgreen &amp; Wynstra 2005).</td>
</tr>
<tr>
<td>Scout</td>
<td>X</td>
<td>Customers who are scouts in the marketplace to gather and dispose of information about market developments (Lindgreen &amp; Wynstra 2005).</td>
</tr>
<tr>
<td>Access</td>
<td>X</td>
<td>Customer’s experience dealing in business-to-business markets can be of considerable help (Lindgreen &amp; Wynstra 2005).</td>
</tr>
</tbody>
</table>
Möller & Törrönen (2003) argue that efficiency is the major underlying factor in direct-value functions of Walter et al. (2001). Instead, their own model is based on efficiency, effectiveness, and network dimensions. The next section discusses this model.

Supplier’s Value Creation Potential

The value creation model of Möller & Törrönen (2000, 2003: 112) considers how a supplier can create value for its business customers. They call the model the supplier’s value-creation potential. The model consists of three function dimensions that form the supplier’s value creation potential. They point out that although the functions are defined as being independent, in practice, they are strongly interconnected.

The supplier-efficiency function dimension is related to pricing, volumes, and safeguarding (Möller & Törrönen 2003), which all highlight the effective use of resources in a business relationship (Ulaga 2003). The supplier-effectiveness function dimension refers to a supplier’s capability of inventing and producing innovative solutions that provide better value for customers than the existing market offering. Solution or product development can be done in cooperation with the supplier and customer. The supplier-network function dimension covers the remainder of the indirect-value functions from the Function of Customer Relationship model of Walter et al. (2001: 369). This function covers the value creation in a broader context than in a supplier-customer relationship (Ulaga 2003). It covers a supplier’s network connections to other suppliers, research and government agencies, and to other customers. It also takes into account information gathering and market-signalling functions. (Möller & Törrönen 2003).

Table 15 lists the supplier functions, categorizes them according to function dimension and gives a short description of each function.
Table 15. Efficiency, effectiveness, and network supplier functions of value creation potential (Möller & Törrönen 2003).

<table>
<thead>
<tr>
<th>Supplier Function</th>
<th>Function Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Efficiency</td>
<td><strong>Efficiency through price level.</strong></td>
</tr>
<tr>
<td></td>
<td>Effectiveness</td>
<td><strong>Efficiency through efficient processes.</strong></td>
</tr>
<tr>
<td></td>
<td>Network</td>
<td><strong>Efficiency through a diverse customer portfolio.</strong></td>
</tr>
<tr>
<td>Profit</td>
<td>X</td>
<td>Supplier in cooperation with customer produces new product and process solutions.</td>
</tr>
<tr>
<td>Volume</td>
<td>X</td>
<td>Network connections of the supplier.</td>
</tr>
<tr>
<td>Safeguarding</td>
<td>X</td>
<td>Market and other information that can be reached from the working environment through the supplier.</td>
</tr>
<tr>
<td>Innovative</td>
<td>X</td>
<td>A relationship with an esteemed supplier may have a positive reference or signalling effect that is realized through the wider network actors.</td>
</tr>
</tbody>
</table>

Value Functions of the Supplier and Intermediary

Geersbro & Vedel (2008) discuss value creation using intermediaries. Their study focuses on buyer’s perceived value. Table 16 lists their value functions.

Table 16. Value creating activities of the supplier and intermediary (Geersbro & Vedel 2008).

<table>
<thead>
<tr>
<th>Value Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Price, quality and time of delivery.</td>
</tr>
<tr>
<td>Logistics</td>
<td>Stocks, assortment, and coordination of deliveries for the construction site.</td>
</tr>
<tr>
<td>Financial</td>
<td>Safeguarding on product guaranties, liquidity, and risk.</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Of products in assortment or portfolio of suppliers.</td>
</tr>
<tr>
<td>Indirect</td>
<td>Market, scout, innovation function, social function.</td>
</tr>
<tr>
<td>Administrative</td>
<td>Billing, coordination of purchases.</td>
</tr>
</tbody>
</table>

The next section summarizes the preceding discussion. As a result, it provides a list of value creation functions of a VAR in the software product business.

Value Creation Functions of VAR in the Software Product Business

In general, value creation is a process where functions or activities of different processes create value (Sharma et al. 2001). The value creation concepts discussed above have a manufacturing industry focus, but we collect the value
creation functions that are applicable to the software product industry to define value creation functions of a VAR in the software product business (see Table 17).

Inbound, operations (Porter 1998) and warehousing (Parolini 1999) functions are not relevant to the software product business. We combine the marketing and sales function (Porter 1998, Parolini 1999), profit function, volume function (Möller & Törrönen 2003, Walter et al. 2001), safeguard (Walter et al. 2001, Möller & Törrönen 2003) as one value function that we collectively group as the marketing and sales function. The definitions of all the preceding individual functions are related to activities and resources, which secure profitable customers and create a sufficiently high sales volume for the supplier (Walter et al. 2001). They are all associated with getting buyers to purchase the products (Porter 1998) as well as services in the PLM systems context.

By definition, the technology development function (Porter 1998) combines both the new product development function and the new process development function (Parolini 1999). Innovation (Walter et al. 2001), or the innovative function (Möller & Törrönen 2003), is related to technology and product development in cooperation with a customer. In our definition, we extend the cooperation to also cover suppliers. We combine all the preceding functions as one value function called product and service development.

The outbound logistics activity (Porter 1998) is more relevant to software product business than to the corresponding definition for the transportation function (Parolini 1999) when thinking about activities required to get products and services to customers. We use the name product and service delivery to refer to this value creating function.

We ignore the service function (Porter 1998), and post-sales assistance function, additional services function, and pre-sales customer services function (Parolini 1999) as functions of their own because the product and service development function includes the activities required to develop services, and product and service delivery function includes the activities associated with the delivery of services. Pre-sales and post-sales indicate at which point of the business relationship services are delivered. We expect to see similar services during both relationship lifecycle stages.

Definitions of the human resource management function of both Porter (1998) and Parolini (1999) are consistent. The term procurement function combines the procurement function described by Porter (1998), the procurement policies
function, and the purchase function (Parolini 1999) in the list of value creation functions.

We combine the IS management and development function and the database management and development function (Parolini 1999) with the firm infrastructure function (Porter 1998). Its definition is very similar to that of the infrastructure activities function (Porter 1998), except that it also includes quality management in the definition. In addition to the preceding value creation concepts, Geersbro & Vedel (2008) discuss value creation using intermediaries. From their list of value functions, product guarantees is added to the definition of the firm infrastructure function. The function of drawing up contracts (Parolini 1999) is covered by the definition of the firm infrastructure function.

The scout function (Möller & Törrönen 2003, Walter et al. 2001) is needed to obtain meaningful information from others outside of the company. The definitions for market function (Walter et al. 2001) and market-signalling function (Walter et al. 2001) are consistent. The definition of firm infrastructure function covers the definition of the access function (Walter et al. 2001).

The resource-access function (Möller & Törrönen 2003) is needed to describe the network connections of a specific supplier, including its linkages to the next-level (suppliers, research and government agencies, and other customers). For clarity reasons, the function is renamed as the VAR’s network.

The preceding value function definitions cover all other functions from Geersbro & Vedel (2008), except the knowledge function, which is added to the list of value functions.

Table 17. Value creation functions of a VAR in the software product business.

<table>
<thead>
<tr>
<th>Value Creation Function</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing and sales</td>
<td>The activities associated with getting buyers to purchase the products and services including channel selection, advertising, promotion, selling, pricing, etc. Activities and resources that secure profitable customers and create a sufficiently high sales volume to the VAR.</td>
</tr>
<tr>
<td>Product and service development</td>
<td>Activities related to technology, product, process, service development, and improvements, preferably in cooperation with customers, suppliers, or both. Delivers products and services to customers.</td>
</tr>
</tbody>
</table>
Mere value creation functions are not enough for a successful business. A company must define both a value creation strategy and business model to conduct its business. The next section discusses how the business model definition captures value.

4.3 Concept of Value Capturing

Although business model and strategy as terms are widely used interchangeably, they do not mean the same thing. The strategy of a company takes into account competition, i.e., how the company does better than its rivals. A company business model aggregates the pieces of its businesses and fits them together as a system. (Magretta 2002). A business model can be seen as a conceptual and architectural implementation of a business strategy and as a foundation for business processes (Osterwalder & Pigneur 2002).

4.3.1 Software Product Business Models

Magretta (2002) gives a practical definition for a business model. It defines the customers, the value the customers get, how this value is delivered to the
customers, and how a company makes money in its business. Chesbrough (2007b) divides a business model into two functions: value creation and value capturing. Value creation requires a series of value adding activities that turn raw materials into products and value for the final customer. Value capturing requires establishing of a unique resource, asset, or position within the series of activities in which the firm enjoys a competitive advantage.

Definition of Osterwalder et al. (2005: 17) is more theoretical: a business model is “a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams.” Rajala et al. (2003: 4) define business model in their research as: “An appearance or manifestation of business strategy or, as an action designed to fit into a specific market situation in order to execute strategic plans.” In the summary and conclusions chapter of their paper, they define the concept of business model as “an appearance of action related to both value creation and appropriation of a single business in a specific product and market situation.”

Cusumano (2008: 23) presents a software business model comprised of the dimensions customers, delivery model, and revenue model. According to him, the traditional software business model has been a model where a software vendor sells its software product as a local client installation to mainstream customers using the up-front license model as the revenue model.

The preceding definitions have distinct views about a business model. In the first definition, Rajala et al. (2003) suggest that a business model is a result or a manifestation of business strategy. Their view is that a business model relates to one product at a time. They argue that the business idea must be ready before a business model may be formulated. The business idea defines how a company will compete in a certain industry, with respect to a certain product, or within a certain market segment (Rajala et al. 2001, Rajala et al. 2003). Magretta (2002) highlights the differences between a business model and business strategy. Later in their paper, Rajala et al. (2003) discuss value creation in the context of a business model. Value creation is at the core of the definitions of Chesbrough (2007b), Magretta (2002) and Osterwalder et al. (2005). Teece (2010) points out that a business model has to be more than a logical way to of doing business. It has to be non-imitable and concentrate on meeting particular customer needs.
External conditions (e.g., competitive environment, customers, resource environment, financing environment, corporate and business strategies, and product or service offering characteristics) set constraints on a business model (Rajala et al. 2001, Rajala et al. 2003). The business model influences a company’s engineering processes, decision-making, and process improvement activities (Kontio et al. 2005).

4.3.2 Business Model Elements

Each author has his or her own view as to which elements should be included in the comprehensive business model. The business model definition of Osterwalder et al. (2005: 18) is based on four pillars: product, customer interface, infrastructure management, and financial aspects. For each pillar, they list one or more sub categories, which they call business model building blocks. In an e-business context, Osterwalder & Pigneur (2002: 3) introduce the same pillar concept, but the pillar names are more informative: products and services, relationship capital, infrastructure and the network of partners, and financial aspects. Chesbrough (2007a) lists the functions of a business model: value proposition, target market, value chain, revenue mechanisms, value network or ecosystem, and competitive strategy.

The business model of Rajala et al. (2003) has been developed to analyze business models of software companies. Their list of the elements of a software business model includes distribution model, revenue logic, service & implementation model, and product strategy. McHugh (1999) takes a more functional view of business models compared to the models of Osterwalder et al. (2005) and Rajala et al. (2003). On that basis, he divides business models into four different functional sub-areas: marketing model, sales model, implementation model, and servicing model.

The following sections take a closer look at the elements of the preceding three business models. For information purposes, the pillar naming conventions of both Osterwalder & Pigneur (2002) and Osterwalder et al. (2005) are freely mixed in the section headings.
**Products and Services**

The product and services pillar is an overall view of a company’s bundle of products and services. In the business model of Osterwalder et al. (2005: 18), the only building block of the pillar is the value proposition that a company wants to offer to specific target customer segments and the capabilities a firm has to assure delivery of this value. Chesbrough (2007a) discusses value proposition. His view limits application to the value created through a product offering.

The software-industry-specific business model of Rajala et al. (2003) includes the product strategy business model element, which describes the product development focus of product development and the way development is organized. It means that a company chooses between developing a customer or project-specific products, standardized commercial products, or something that is somewhere between these products. A product can be a software product, service product, or a combination of the two.

The implementation model functional sub-area from the business model of McHugh (1999) can be partly ranked within this category. According to its definition, the model includes the activities needed to implement and deploy a software product as a working solution.

Content of the preceding business model elements differ in nature. The view of Osterwalder et al. (2005) is value and capability centric, whereas Rajala et al. (2003) concentrate more on software product types. The view of McHugh (1999) is straightforward, as it concentrates only on the activities needed for implementing the software product.

**Customer Interface**

Customer interface describes the customer segments, the ways in which a company gets in touch with its customers, and the relationships the company has with its customers (Osterwalder et al. 2005). A company wants to offer value to certain customer segments (Osterwalder et al. 2005) and to users to whom the offering is useful (Chesbrough 2007a). The building blocks of this pillar are target customer, distribution channel and relationship (Osterwalder et al. 2005). Channel strategy defines how the right quantity of the right product or service is available at the right place, at the right time, and to the right people (Osterwalder & Pigneur 2002).
In the software product context, Rajala et al. (2003) differentiate between the distribution model and the service and implementation model. The distribution model identifies the sellers and marketers of the company’s product and service offering. Correspondingly, the value chain defines the structure required by the company, including both suppliers and customers, to create and distribute the offering and determine the complementary assets needed to support the company’s position in the chain (Chesbrough 2007a). The distribution model can vary from centralized/collaborative, which means mainly direct contact with customers, to being decentralized/transactional where a company has a partner network that is responsible for marketing and sales activities and product delivery. (Rajala et al. 2003). Osterwalder & Pigneur (2002) present a corresponding definition for potential channel types: direct channels and indirect channels. It is always possible to use a mix of these two channel types.

The service and implementation model defines how the software product is delivered to the customer as a working solution. The two ends of the model types are IT consulting and customer-specific system work (complex/tailored model) and self-service (standardized model). Between these two ends of the spectrum, there are system integration projects, software deployment, and on-line services. When defining a service and implementation model, a company needs to make decisions about who will be considered an active doer. It could be the vendor itself, the customer, or a third party, such as a consulting firm. (Rajala et al. 2003).

McHugh (1999) concentrates on activities in his definition. His marketing model contains activities that the software vendor uses to invoke customer interest in its software product. The sales model describes activities performed beginning with the customer’s first interest to when the contract is signed. Service and support activities (e.g., maintenance, product upgrades, and technical support) are described in the service model. The implementation model can partly belong to this category, since according to the definition it includes what is needed to implement and deploy the software product as a working solution. Implementation, consulting, and training services can belong to both the implementation and service models (McHugh 1999).

In this context, Osterwalder & Pigneur (2002: 6) talk about the information strategy, which is the strategy of gathering customer information. They outline how to utilize this information in customer relationship management and how to use customer information to discover new and profitable business opportunities and ameliorate customer satisfaction.
Infrastructure management has a value configuration, core competency, and partner network as its building blocks. It defines arrangement of activities and resources, requisite competencies to implement the business model, and network arrangement of partners, all of which are needed to complete the value proposition. (Osterwalder et al. 2005). A company uses inside and outside activities and processes to create value for its customers. A partner network can also be referred to as an ecosystem (Chesbrough 2007a) that participates in the value creation by executing certain activities, processes, or part of the processes throughout the value creation process. (Osterwalder & Pigneur 2002). The definition should be extended to include customers and identification of potential complementary players and competitors (Chesbrough 2007a).

The definitions offered by both Cusumano (2008) and Rajala et al. (2003) fail to cover the capability and partner network aspects of a business model.

Financial Aspects

Financial aspects describe the way a company makes money and sums-up the monetary consequences of the business model implementation. Cost structure and revenue model are its building blocks. (Osterwalder et al. 2005: 18). By defining a pricing model, a company translates its value proposition into money. This generates a revenue stream. A company may use several pricing models depending on the target customer and the product offering. The cost structure defines the costs generated when creating, marketing, and delivering the value proposition to customers. A company may find the potential for cost savings by concentrating on its core competencies and outsourcing the activities that require non-core competencies to its partner network. The profit model is a result of the difference between the revenue model and the cost structure. (Osterwalder & Pigneur 2002).

In the business model of Rajala et al. (2003), the generation of a company’s revenue and profit is defined by revenue logic, which defines how a company finances its operations. A company’s revenue logic can be based on effort, cost, or value-based pricing, where revenue is generated from training services, integration projects, maintenance services, tailoring services, license sales and royalties, or in some cases, to loss leader pricing, where the product or service is
sold at less than its value. Revenue logic can also be a mix of previously mentioned logics.

According to Cusumano (2008: 23), a software vendor has the following revenue model possibilities: up-front license fee, subscription/SaaS, advertising-based, transaction-based, free but not free (bundled), and free (revenue from services). He states that software product developers are shifting toward service oriented business because although revenue from software products is still growing, revenue from services is growing faster. This also means that the companies that used to be partners might become competitors in the service business. Table 18 summarizes the business model element types and their building blocks according to the preceding discussion.

### Table 18. Business model elements and their building blocks.

<table>
<thead>
<tr>
<th>Business Model</th>
<th>Element Type</th>
<th>Building Block</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product and services</td>
<td>Value proposition</td>
<td>(Chesbrough 2007a, Osterwalder et al. 2005)</td>
<td>Value a company offers to a specifically targeted customer segment.</td>
</tr>
<tr>
<td>Customer interface</td>
<td>Product and service strategy</td>
<td>(Rajala et al. 2003)</td>
<td>Describes the product and service development focus and the way the development is organized.</td>
</tr>
<tr>
<td></td>
<td>Implementation model</td>
<td>(McHugh 1999)</td>
<td>Defines the activities needed to implement and deploy software a product as a working solution.</td>
</tr>
<tr>
<td></td>
<td>Target customers</td>
<td>(Chesbrough 2007a, Osterwalder et al. 2005)</td>
<td>Describes the segments of customers to whom a company wants to offer value.</td>
</tr>
<tr>
<td></td>
<td>Marketing model</td>
<td>(McHugh 1999)</td>
<td>Activities a company undertakes to invoke its customer interest into its software product.</td>
</tr>
<tr>
<td></td>
<td>Sales model</td>
<td>(McHugh 1999, Rajala et al. 2003)</td>
<td>Activities performed beginning with the customer’s first interest until a contract has been signed.</td>
</tr>
<tr>
<td></td>
<td>Service model</td>
<td>(McHugh 1999, Rajala et al. 2003)</td>
<td>Service and support activities.</td>
</tr>
<tr>
<td></td>
<td>Relationship</td>
<td>(Osterwalder et al. 2005)</td>
<td>Explains the kinds of links a company establishes between itself and its customer segments.</td>
</tr>
<tr>
<td></td>
<td>Information strategy</td>
<td>(Osterwalder et al. 2005)</td>
<td>Strategy of gathering customer information, utilizing this information in customer relationship management, using customer information to discover new business opportunities and to ameliorate customer satisfaction.</td>
</tr>
</tbody>
</table>
The roles of value creation functions (see Table 17) and business model elements and their building blocks listed on preceding table are somewhat overlapping. In the research at hand we do not do any integration between the functions and the elements. Instead we consider the value creation functions to be activity type in nature, which according to the definition of value creation function (Parolini 1999). Further we consider that a business model is seen as a conceptual and architectural implementation of a business strategy. It is a foundation for business processes (Osterwalder & Pigneur 2002). A business model defines the customers, the value customers receive, how this value is delivered to customers, and how a company makes money in its business (Magretta 2002).

### 4.3.3 Business Model Selection

Software product price and sales cycle are the main factors when selecting a business model. Expensive and complex software products, software products that use either immature technology or are based on a complicated mixture of software components, or software products that have a major impact on the
implementing organization normally all have long sales cycles. These types of
products do not fit business models that use indirect channels. (McHugh 1999).

McHugh (1999) presents a definition of sales channel, which is based on
interdependence on price and length of sales cycle. He introduces high, medium,
and low price categories. For each category, he gives price limits in pounds but
the research at hand does not use them because the conversion between 1999 and
today’s price level is not accurate. Price level influences the kinds of sales
channel possibilities a software supplier has for its product.

A high priced product with a short sales cycle option is not feasible. A low
priced product with a short sales cycle is common. A vendor can use direct
response sales techniques (telesales or Internet sales) and volume channels (retail
outlets, mail orders, and mainstream distributors). Software products with a high
price and a long sales cycle require field sales with the help of value channels
such as IT consultants and system integrators. Competitive markets, or a
technology product, which needs customer communication may lead to low price
and long sales cycle. It is an indication of an unhealthy business. Also, companies
in early maturity may use this strategy to make their mark on markets and gain
references. When selling medium priced products, the sales channel choices vary
from direct response to use of value channels such as resellers and re-publishers.
(McHugh 1999).

A software product sales cycle varies from a few minutes to several months,
or even years. The length of a sales cycle is dependent on price. For a customer, a
low priced product is easy to buy, even if he is unsure about the product’s
necessity or suitability because the investment is not that big. If a product is
expensive, a customer needs more time to think about the pros and cons of the
investment. Maturity of the software product also has a bigger effect on the length
of the sales cycle. If a technology or concept is new, it takes time before it gains
market acceptance. In some cases, a market needs education about the technology
or concept in order to gain interest and acceptance. This phase requires the
software vendor’s involvement. When a software product and the technology it is
based on are mature, the business model can be changed from vendor-led to more
of a value channel-led model. The complexity of the software product and its
effect on the customer organization also lengthens a sales cycle. (McHugh 1999).

Selection of a sales channel can also be based on market geographics. When a
company is a beginner, it normally does not have the money and resources to
concentrate on global markets. It limits the geographic scope of its markets to its
home markets and possibly to nearby countries. If it wants to expand its market size, it can use sales channels. Even when a company is in its mature state, a combination of direct sales in certain countries and channel sales in other countries is appropriate. (McHugh 1999).

When thinking about which type of business model will be successful, a software vendor has four possible delivery models to consider: direct model, partner model, channels model, and hybrid model. In the direct model, the software vendor takes control of all marketing, sales, implementation, and business support functions. A direct model is typically used when a software vendor concentrates on niche markets, often within a certain vertical market sector where the value of deals is more important than the number of deals. A direct model is also suitable when a software product is complicated and a need for a certain level of expertise is needed to sell the product successfully. In these cases, it is quite common that the sales cycle will be long (McHugh 1999). Integrators and partners can be used to support implementation (McHugh 1999), in an enterprise system business where they can have also marketing responsibilities. According to (Hoch et al. 2000), SAP, a large enterprise system company, receives a large number of its orders through system integrators that implement SAP systems.

In the partner model, software vendors still hold control of marketing, sales, and service activities. A partner or third party takes care of deployment and implementation activities. They may also have a supporting role in marketing activities and sales activities can be a joint effort. The third option is the channel model where a partner or third party is responsible for sales activities in addition to implementation activities. A hybrid model is the combination of two or even all three of the previously mentioned models. A software vendor uses this model when it wants to use multiple channels to reach markets. Partners and channels are used to generate sales and service customers. (McHugh 1999).

While there are many companies participating in the PLM market, only a few are typically considered to be at the forefront of the market in terms of either revenue generation or thought leadership. With broad-based capabilities that support a full, product lifecycle focused solution, the group of market leaders for 2008 was Dassault Systèmes, Siemens PLM Software, PTC, SAP, and Oracle (in this order) based on combined revenue (direct and indirect revenue). (CIMdata 2009).

All leading PLM system suppliers sell their products and services through their own field sales and support organizations. This is their core or direct revenue.
Each of them also has an increased market presence associated with consultancies, systems integrators, value-added resellers, and other partners that sell and provide services based on the market leaders’ technologies and products. In 2008, the market PLM leader, Dassault Systèmes, generated over 40% of its revenue from its partner network. (CIMdata 2009).
5 Model of VAR Value Creation in the PLM Systems Context

As a result of the preceding theoretical discussion, a preliminary conceptual framework is created for studying why and how a VAR creates value for its suppliers and customers in the PLM systems context. The preliminary conceptual framework includes three main actors of traditional marketing channel formats, the producer, the distributor, and the consumer. In the research at hand, the term supplier is used to denote a producer, the term VAR is used to denote distributor, and the term customer is used to denote consumer (see Section 3.1.1), and the term business actor is used to denote any of the following: supplier, VAR, customer, or any combination of the preceding terms. The three business actors are used later as a basis for the analysis of the empirical data.

5.1 PLM Systems Context

The PLM systems context is an IT ecosystem (see Section 3.1). A PLM system supplier is the keystone organization because it according to the definition provides the platform and is responsible for the ecosystem orchestration. In this case, the platform is the PLM system. The PLM systems ecosystem has other hubs as well, such as other Application Software Developers (ASD), Hardware Developers (HW-D), and Infrastructure Software Developers (ISD). An ASD or an ISD might be a niche player in the PLM systems context (see Section 3.1).

In the PLM systems context, PLM system suppliers are keystone, dominator, or landlord organizations (see Section 3.1). In this context, a VAR can either be a hub or a niche player, depending on its strategy. The VAR is an influencer, but it has the flavour of hedger strategy if it develops its own product. A VAR can be an influencer or disciple by default because the agreement limits their scope. Suppliers of a VAR can follow the hedger strategy (see Section 3.1). The research model considers all hub, keystone, and niche player organization to be as suppliers to VARs.

In the PLM systems context, there are only a few supplier companies that can be considered keystone organizations. They are equal in size and power. They all use their own sales channel and support organizations in parallel with partner networks to extend their presence in the market (see Section 3.7).

The PLM systems context is a domain-specific ecosystem because the PLM system software developer has opened the system API to its ecosystem partners. It
can also be seen as a market-oriented ecosystem as it concentrates on PLM markets only, and this can be further limited vertically to PLM markets in a certain industrial sector (see Section 3.1).

In general, the lifecycle stage of the PLM systems context is the self-renewal stage (see Section 3.1), as the PLM business can be considered a mature business because its development began in the 1980s (see Section 2.4.3). But if an ecosystem is market-oriented to a certain industrial sector, then the lifecycle stage could be earlier (i.e., expansion or leadership stage) depending on the industry. Automotive and aerospace industries are mature PLM markets, but in contrast, consumer-product businesses (e.g., food and beverage, pharmaceutical, and apparel) are in the early stages of their PLM journey (see Section 2.4).

The PLM systems context is not geographically restricted. It is global B2B markets (see Section 3.5). The PLM systems context includes public bodies (i.e., governments, media, banks and investors, and legal and consultancy firms), which may all have an interest in and impact on the context, but over which the context has little or no control (see Section 3.8).

In the PLM systems context, technological connections between the companies are strong because PLM systems are complicated social and technological systems (see Section 2.2). In this context, know-how of a company is a combination of the knowledge of the company’s personnel and the knowledge of the company. A company’s personnel represent their company in business relationships and form social relationships. Although business relationships are often informal in nature, there are always certain legal independencies involved (see Section 4.1.3).

### 5.1.1 Supply Network and Delivery Network

The PLM systems context is further divided into supply and delivery networks. A supply network includes the companies that act as suppliers of a VAR, which is the type of company of interest in the research at hand. A delivery network is responsible for delivering and deploying PLM systems and related services to customers. When viewing the delivery network from the PLM system supplier standpoint, it is either a direct channel (i.e., when the supplier delivers directly to its customers), or may be an indirect channel (i.e., when the supplier uses a VAR as a distributor). There can also be a triad structure in addition to the preceding
channels and networks; the supplier, VAR, customer, and the relationships between them all can form a triad (see Section 3.1.1).

5.1.2 Context Elements

Elements within the PLM systems context can both constrain and empower suppliers, VARs, and customers. Governmental restrictions, taxes, and tariffs apply to it as to any other software business. Competition is one element in the PLM systems context. There are a few PLM system suppliers that are roughly equal in size and power and that compete with each other, but no clear industry leader exists (see Section 3.7). All leading PLM system suppliers use indirect channels to extend their market presence (see Section 4.3.3), which means that VAR competitors are other PLM system suppliers as well as all other VARs.

Working with partners is another context element (see Section 3.6), but the research at hand considers partners to be a form of supplier. Public bodies create context elements in the PLM systems context. Legislation is another matter to consider, as it can either restrict or empower a VARs business in the PLM systems context. There is the possibility of influencing legislators, which makes legislation a bidirectional context element (see Section 3.8).

Fig. 5 summarizes the conceptual framework elements of the PLM systems context. The main scope of the research at hand is the VAR-supplier and VAR-customer relationships (solid line), but it is expected that the supplier-customer relationship (dashed line) also has an influence according to the concept of interconnectedness in triads.
5.2 Suppliers

Suppliers in the PLM systems context are companies that deliver software, hardware, or service products to the focal VAR. According to the definition of VAR, they integrate a complete solution consisting of hardware and software components (see Section 3.3.4). These components can be purchased from ASDs, ISDs, or from HW-D (see Section 3.2). Consultants can also be considered suppliers in this context because they might deliver their service products to the focal VAR (see Section 3.4).

The ASD type of supplier in the PLM system context has the platform (i.e., the PLM system). It has a special role among the other suppliers. It has opened the API of the PLM system to its ecosystem partners. That is why it plays a keystone role in the PLM systems context (see Section 3.1). All other suppliers are either niche players or hubs (see Section 3.1).
In the PLM systems context, a supplier has a business model that defines, among other things, the distribution channel model (i.e., how the product is delivered to customers). Fig. 6 summarizes the framework elements of the suppliers within the research context. The following sections discuss the details of these elements.

![Fig. 6. Research framework elements of the suppliers in the PLM systems context.](image)

### 5.2.1 Supplier Business Goals

The supplier business model defines who the customers are, what value customers receive, how this value is delivered to customers, and how a company makes money (see Section 4.3.1). Software product price and sales cycle are the main factors when selecting a business model. PLM systems are complex and expensive software products. They are based on a complicated mixture of software components or software products, and have a major impact on the implementing organization. That is why they normally have a long sales cycle. Business models that use indirect channels are not feasible for suppliers of PLM systems (see Section 4.3.3).

All elements of a business model are equally important, but in the context of PLM systems, the delivery and revenue models, partner network elements have a higher importance because the leading PLM system suppliers increase their market presence using a partner model in addition to their own field sales and support organizations. In addition, a major share of their revenue is generated through the activities of their partner network (see Section 4.3.3).
5.2.2 Supplier Offering

In the PLM systems context, there are several software (SW), hardware (HW) and service-product type of products that the focal VAR uses when integrating and delivering a comprehensive solution to a customer that fulfils the customer’s requirements. A PLM system is a core element of the solution. In general, PLM systems are modular; they support generic business processes, need configuration during the implementation phase, and must be integrated with existing IT infrastructure and, in some cases, with the customer’s proprietary legacy systems as well (see Section 2.3).

A PLM system is a software product. If a customer does not have enough HW capacity, a focal VAR or the customer itself must purchase additional capacity from an HW-D supplier. An ISD supplier offers products closely related to an HW-D supplier (see Section 3.2).

According to the definition of VAR, they offer solution implementation and customization services as well as consulting services to their customers (see Section 3.3.4). A service product may come from any of the suppliers (see Section 3.2), but it may also be developed by a VAR itself.

5.2.3 VAR-Supplier Value

In the PLM systems context, a VAR creates value for its suppliers (supplier-perceived value), receives value from its suppliers (supplier-created value), and the business relationship between supplier and VAR creates value for both parties. The scope of the research at hand is the VARs created value. Nevertheless, we consider that supplier-created value ought to be part of supplier-VAR value because it is expected that a VAR uses or forwards at least part of the supplier-created value when creating value for its customers.

Supplier-Created Value

Supplier-created value is the value a supplier creates in favour of a VAR. The list of elements that add value in the PLM systems context is derived from the discussion about supplier-created value (see Supplier-Created Value in Section 4.1.2):
- Reduced transaction costs (negotiating, writing, and processing of each sales contract).
- Reduced negotiation time.
- Increased productivity and financial performance.
- Increased perception of added value in a channel relationship through frequent managerial contacts.
- Greater access to current knowledge about competitors, customers, and other constituents.
- Created perception that the supplying partner is more knowledgeable about, and better attuned to, the reseller’s needs.
- Developed perception of value for the reseller (the supplier appears to be truly concerned about the reseller).
- Product quality, reliability, and price/cost.
- Product profitability, line assortment, guarantees, physical design, product improvements and innovations, and the market competitiveness of the product.
- Relationship-specific investments, such as training, technical support, specialized facilities, technological interfacing, and territory selectivity.
- Lower selling costs.
- Higher sales volume.
- Supplier’s commitment to promote the product.
- Relationship of trust and credibility with the customer.
- Possibly higher margins on strong brands.

Manufacturing, logistics, warehousing, and inventory related values are removed from the list as they are not relevant in the SW product business. Direct and indirect reseller costs are valued as mere selling costs in the framework. The increased perception of added value in a channel relationship and obstructed relationship dissatisfaction are combined as one value, because they are opposites. Where there are benefits, there are always sacrifices. In this case, the sacrifices include direct product costs, acquisition costs, operation costs, etc. But because the scope of the research at hand is value creation, costs are not included in the preliminary research framework.
Supplier-Perceived Value

Supplier-perceived value is the value a VAR creates for its supplier. The list of elements that add value in the PLM systems context is derived from the discussion about supplier-perceived value (see Supplier-Perceived Value in Section 4.1.2):

- Company performance (secured “break-even” volume, operation on a profit-making basis, a positive cash flow, stability and control in sales).
- Technological know-how and creative ideas.
- Gaining access to new markets (i.e., new customers).
- Gaining critical market information.
- Access to third parties.
- Easier introduction of new products.
- Relationship of trust with customer.
- More control over resellers.

Manufacturing related value is removed from the list as it is not relevant in the SW product business. The higher sales volume value is combined with company performance value. Costs are also removed from the preliminary research framework because the scope of the research at hand is merely value creation. Related to VAR-supplier value, there is also a coopetitive-created value, which two competing companies create together but compete to capturing the value (see Coopetitive-Created Value Section 4.1.2). The fourth dimension of the VAR-supplier value (the relationship value) is defined in Section 5.3.4.

5.3 VAR

In the PLM systems context, VARs are hub organizations. They are connected to suppliers and use their products and services to create and deliver value to their customers. They have special capabilities that differentiate them from other companies in the PLM systems context and these capabilities are used to leverage products and services in their context (see Section 3.1).

In the PLM systems context, a VAR performs product functions by building an assortment of products and services from different suppliers so that the product and service offering is attractive to customers. It makes products and services available for customers in a certain place and time, so that customers can easily
obtain them. According to the definition of VAR (see Summary in Section 3.3.4), a VAR can do its own software development and this is also applicable in the PLM systems context. In this context, a VAR is also responsible for provisioning certain activities (i.e., planning, acquiring, integrating, testing, and training future end users). In some cases there is also a need to either modify the PLM system software or to create a new piece of software to fulfill the end user requirements (see Section 3.3.4).

Usually, a VAR performs activities related to inventory management and physical distribution. But in the PLM systems context, these activities are not feasible because PLM systems are a combination of software (an immaterial product) and hardware purchased from HW-Ds (see Section 3.3.4). On the other hand, activities related to selling and after-sales service are very much activities that a VAR performs in the PLM systems context, as all leading suppliers in the PLM systems context try to expand their market presence and service capability using different types of intermediaries, such as VARs (see Sections 3.3.4 and 4.3.3). The specific activities and the VARs involvement will differ depending on the customer or sales context (see Section 3.3.4).

A company needs to define its business model and strategy to conduct its business successfully. Company strategy defines how a company does better than its rivals. The business model will define who the customers are, what value customers will receive, how this value is delivered to customers, and how a company makes money in the business. Value creation is a process that includes activities linked by flows of material, information, financial resources, and influence relationships. They are carried out using different types of resources. The relationships between value creation strategy, business model, and value creation functions of a VAR in the PLM systems context are presented in Fig. 7. The following sections discuss the content of these elements.
5.3.1 Value Creation Strategy

Each company has its own value creation strategy. To develop effective marketing or purchasing strategy, optimize the activities and processes, and identify the competences involved, a company must recognize the value creation strategies of its counterparts.

A VAR in the PLM systems context has a value creation strategy. The business model selected by a supplier has an effect on both the VAR’s strategy and its business model. The research at hand views the value creation strategy of a VAR from two viewpoints: the strategy for creating value for its customers, and the strategy for creating value for its suppliers.

Customer-Perceived Value Creation Strategy

Table 11 summarizes the value creation strategy alternatives. Core value strategy is feasible in mature markets. In the PLM systems context, automotive and aerospace industries can been seen as mature markets, but food and beverage, pharmaceutical, and apparel industries can be considered immature markets (see Section 2.4). This leads to a situation where a VAR must define industry-specific value creation strategies.

Mere core value creation is not enough in this context because feature sets of the PLM systems, as with any enterprise systems, are based on a series of assumptions about how companies operate in general. Software developers have established such assumptions (see Section 2.3). There may be a need to develop
new features that are missing from the original feature offering. According to the definition of VAR, they can complete their own software development and offer different types of services to their customers (see Section 3.3.4). To be successful in software and service development requires that a VAR adopt either a value-added or future-oriented value strategy (see Section 4.2.1).

Supplier-Perceived Value Creation Strategy

In the PLM systems context, a VAR must commit to its suppliers’ products. But this alone is not enough because suppliers look for quality, channel-strong, and channel-friendly partners with an existing customer base that has growth potential, partners able to cover different geographical markets, and partners who are able to fulfil technical requirements of sales and implementation activities (see Section 3.3). To be an attractive partner for suppliers, a VAR cannot rely on only its core value strategy. Its value strategy must be a combination of all three-value creation strategies (see Section 4.2.1). Again, a VAR’s value strategy toward a supplier is supplier-specific because a supplier’s business model selection has an effect on a VAR’s value creation strategy.

5.3.2 Business Model

The VAR business model will define who its customers are, what value the customers will get, how the value will be delivered to the customers, and how a company makes money (see Section 4.3.1). According to the definition of a VAR, they are intermediaries (see Section 3.3.4) responsible for creating value for suppliers and customers (see Section 3.3). In the PLM systems context, a leading supplier uses a mixed channel model to increase their market presence and to maximize revenue generation (see Section 4.3.3).

Table 18 summarizes the types of business model elements and their related building blocks. All elements of the business model are important, but in the PLM systems context and in the VAR business model definition, those elements that provide added value for either customers or suppliers, are the most important.
5.3.3 Value Creation Functions

In the PLM systems context, a VAR performs activities through which it creates value for its customers, its suppliers, and itself. Table 17 summarizes the value creation functions of VARs in the PLM systems context. They belong to three categories, (1) realization functions, (2) support functions, and (3) external transactions management functions. Each category has several functions that all create value for either customers, suppliers, the VAR itself, or any combination of these business actors.

5.3.4 VAR-Supplier Business Relationship

The VAR-supplier relationship in the PLM systems context is a supplier-intermediary relationship. In a supplier-intermediary partnership, the value of the competitive advantage is created by any combination of financial, special, human, organizational, relational, and informational resources. But the value of these resource combinations is largely determined by sustainability of the partnership. Sustainability has many dimensions, e.g., resources that should be acquired at an efficiency-enabling price, or resources that should be unique and not easily imitated (see Section 3.3.1).

The VAR-supplier business relationship has lifecycle stages, as with any other business relationship. The lifecycle stages are build-up, maturity, and decline (see Section 4.1.3).

VAR-Supplier Business Relationship Value

The VAR-supplier business relationship value is the value that the business relationship creates for both supplier and VAR. In a business relationship, trust can be considered a core value. It is the cornerstone for establishing and maintaining a successful relationship between the parties. In relational value creation, the relationship itself is a resource that creates value. The business relationship value is dependent on the lifecycle stage of the relationship. The VAR-supplier business relationship value in the PLM systems context is derived from the discussion in Section 4.1.3 (see Table 7, Table 8, and Table 9):

- Personal value.
- Financial value.
knowledge value.

- Strategic value.
- Product quality.
- Delivery performance.
- Service support.
- Personal interaction.
- Supplier know-how.
- Time-to-market improvement.
- Mutual dependence.
- Mutual commitment to customer satisfaction.
- Concern for others profitability.
- Trust.

The supporting factors (see Table 10) are excluded from the list of values, as they have already been covered by the existing elements of the list. The shared goals and objectives and the open lines of communication core value (see Table 9) are also excluded as they are covered by personal interaction (see Table 8).

### 5.4 Customers

PLM systems are B2B product software targeted to business customers. For this reason, in the context of PLM systems, customers of the VAR are B2B customers that are either other companies or organizations from within institutional markets (e.g., schools and hospitals). These customers are professional buyers looking for a complete solution from a single vendor. The buyer, or at least the approver, of a PLM system investment belongs to higher-level management (e.g., the CIO, CTO, CFO, and in some cases the CEO, see Section 3.5).

When planning to invest in a PLM system, the customer has certain business goals that it would like to achieve through implementation of a PLM system. During the system implementation process, the customer creates a business relationship with the VAR. During the business development process, the VAR creates VC, the customer creates value for the VAR, and their business relationship creates value for both of them. The customer utilizes the received value to create business benefits for itself. Fig. 8 summarizes the conceptual framework elements of the customers in the research context. The following sections discuss the content of these elements.
5.4.1 Customer Business Goals

A customer sets certain business goals that it wishes to achieve through its PLM initiative. It evaluates the results of the initiative by how well it has achieved its goals. In general, the goal and expectation of senior management and company owners is to gain benefits that the PLM system will bring to the company. At the operational level they expect to see cost savings (e.g., IT cost savings, shorter turnover time, and improved productivity and service quality). Management-level interest is in the optimized use of company resources. At the strategic level, the main interest is in how the system supports expansion of the company’s business and new business models. They are interested in the impact of the system at the organizational level, like need for new skills (see Section 2.4.2).

A customer utilizes the value it receives to gain business benefits. Benefits are realized differently in different situations and at different points in time, and different stakeholders perceive the benefits differently. Financial payoff may be difficult to verify. Benefits can be evaluated at the operational, managerial, strategic, IT infrastructure, and organizational levels (see Table 3). In the research at hand, the term customer business goal is used to denote the term enterprise system benefit.
5.4.2 VAR Offering

A VAR either adds its own product(s) or service(s) to a software supplier’s product or the VAR simply provides its own product. The VAR does provide software product implementation related activities as a service. The VAR may customize computer hardware and software for individual clients or customer segments and will earn a price premium in the process (see Section 3.3.4).

Business consultancy includes such activities as help and support for solving operational and strategic problems, business plan development, technology selection, and business process improvement. Industry consultants analyze and capture the needs of various business segments and convert them into requirements for application software features and capabilities. The research at hand considers both business and industry consultancy as a service product (see Section 3.4). Financial services can be offered through strategic partnership arrangements with a financing company such as a bank and are considered service products as well. SaaS is a bundle of software and related services that may include delivery, training and maintenance services, and is offered to customers also as a service product (see Section 3.3.4).

B2B customers require customer-specific after-sales service, the requirements for which may vary depending on the stage of the product lifecycle. Many services are provided during the negotiation and implementation phases, before the actual product is placed in the hands of the customer. The research at hand counts after-sales services as a type of service product and the related functions as belonging to realization functions (see Section 3.3.4).

In the preliminary conceptual framework supplier offering is an element of the supplier business actor but VAR offering is placed as an element of the customer business actor. Reasoning for that is that according to the literature review the VAR offering is determined by the customer specific requirements.

5.4.3 VAR-Customer Value

Value is a cornerstone of the PLM systems context because of the accentuated importance of the PLM system performance and functionality, although customer value is not dependent on only the richness of functionality, but is the result of the total value proposition that consists of the PLM system, related services, channel, and future ideas. In this context, value can be evaluated through the economic,
technical, service, and social benefits the customer gains in exchange for the price it pays for the PLM system and for the related services (see Section 4.1.1).

Where there are benefits, there are always sacrifices, since customer value is a trade-off between benefits and sacrifices. Sacrifices are material or non-material valuables in which a customer needs to invest to gain access to the benefits of an offering (see Section 4.1.1).

Value can be viewed from the customer’s perspective, where the focus is on how a VAR creates superior value for its customers and how a customer sees this value compared to the corresponding value of an offering of a competitor. In the VAR’s perspective, value creation is seen to be the attraction, development, and retention of customers. The VAR-customer business relationship perspective is in focus when value is jointly created in the business relationship.

**VAR-Created Value**

In the PLM systems context, VAR-created value is the value the VAR creates for its customers through its product and service offering and through its value creation functions. The value can be evaluated at the PLM system and related service level. It can also be viewed at the usage level, i.e., how well their features can be utilized during the use phase. Alternatively, value can be reviewed based on how well the customer’s business goals and purposes are achievable by using the PLM system and related services. Table 5 aggregates this value hierarchy model by listing value levels, source of value, and related customer satisfaction.

The value that the product and service offering generates will be dependent on the phase of the business development process that exists between the VAR and the customer. Table 4 summarizes the process phase-specific values and gaps. The value of a product is customer-specific, especially when considering value from the point of view of the PLM system usage or when viewing it over time.

**VAR-Perceived Value**

In the PLM systems context, the VAR-perceived value is the value the VAR gains from its customers. The value creation is dependent on the type of VAR-customer business relationship, which can be a low-performing relationship, a selling relationship, a networking relationship, or a high-performing relationship. The difference between each of these relationships is the number of direct and indirect
value-creating functions. Direct functions include activities and resources that create value regardless of other relationships and that contribute to the profitability of the VAR. Correspondingly, indirect functions involve future value creation and have an impact on the exchange within other relationships (see Supplier-Perceived Value in Section 4.1.2).

5.4.4 VAR-Customer Business Relationship

Cooperation and value creation are the measurements used to determine business relationship usefulness. In general, the VAR-customer business relationship in the context of PLM systems can be considered continuous and rather stable, but complex. A long history means that individuals working within the relationships are bound by what has previously occurred between the VAR and the customer. Both companies try to modify and to adapt products, services, routines, and rules of conduct to better function with each other. In addition to cooperation, each business relationship undergoes a certain amount of conflict, which helps keep the relationship healthy (see Section 4.1.3).

A business relationship has a lifecycle. Relationships are characterized by strong growth in the build-up stage; their growth is minimal in the maturity stage; and finally, they shrink in the decline stage. A VAR’s potential for superior value creation in the customer’s sourcing process is the strongest in the early stages of the relationship lifecycle because customers have a strong need for personal interaction and service support during the build-up stage. Roles of know-how transfer and time-to-market has variance while the relationship moves through its lifecycle. Customers need experience in dealing with the respective suppliers in order to fully understand and assess their value creating potential. The relationship lifecycle does not affect the role of a VAR’s value creation through the core offering because customers value product quality and delivery performance independent of the relationship lifecycle stage. Relationships may experience a second growth as a result of the introduction of a new product or service (see Section 4.1.3).

VAR-Customer Business Relationship Value

In the PLM systems context, VAR-customer relationships can deliver value related to different dimensions and operational variables (TRV). Table 7 aggregates the four value dimensions, which are personal, financial, knowledge,
and strategic values and the related operational variables. In a relationship, value is delivered in one or more of the four dimensions, each of which is indicated by a number of operational variables that may or may not be present.

In a business relationship, companies perform activities and utilize resources to produce something unique, which neither party can accomplish in isolation (i.e., the A-R-A model; see Section 4.1.3). Customer value in business relationships can be improved by either increasing relationship benefits or by decreasing relationship costs. Both the VAR and the customer can perform activities that contribute to value creation at different levels. Table 6 summarizes action levels, the level-specific nature of values, and value creation.

5.5 Summary

Fig. 9 presents the preliminary conceptual framework of VAR value creation in the PLM systems context. Context elements both constrain and empower the actors in the PLM systems context. The actors are suppliers who deliver SW, HW, and service products to the VAR. To fulfil customer requirements and to create value for the customer and suppliers, a VAR integrates a complete solution from the preceding components and from its own product and service offering. At the same time, a VAR expects to gain business benefits. The supplier-customer business relationship has been added into the framework, although it does not belong to the main scope of the research. It is expected that some type of cooperation between these two business actors will be seen.
Fig. 9. A preliminary conceptual framework of VAR value creation in the PLM systems context.
6 Research Design

Research in business and management focuses on a topic that is of relevance to one or more of the business management disciplines. Myers (2009) lists accounting and finance, commercial law, economics, human resource management, logistics and supply chain management, organizational behaviour and organizational development, information systems, management strategy and international business, marketing, and operations management as areas that belong under business management disciplines. The research at hand focuses on the disciplines of management strategy and international business, marketing, and information systems. It presents a qualitative interpretive multi-case study. This chapter gives the reasoning for selecting the research and data collection methods. In addition, the data collection methods and data analysis are briefly described. Finally, the research process is presented at the end of the chapter.

Epistemology guides the research through the related philosophical assumptions. Epistemology is defined to be the theory of knowledge and how it can be obtained. (Myers 2009: 35). Myers (2009) suggests that it is important to understand the grounds and limits of the knowledge, especially if a researcher does qualitative research. There are several proposed paradigm categorizations for qualitative research. Myers (2009) proposes that qualitative research is categorized to positivist, interpretative, and critical research.

In general, positivist researchers assume that reality is objectively given. A positivist researcher attempts to test a theory and in that way increases the understanding of the theory. Interpretive researchers assume that access to reality is only through social constructions. They focus on the meaning in a given context. They attempt to understand phenomenon through the meanings that people assign to them. Critical researchers assume that social reality is historically constituted and that it is produced and reproduced by people. They perform a critique of the current social situation, but can also suggest improvements. Positivism is the dominant form of research and critical research is a more rarely used form of research in most business and management disciplines. (Myers 2009: 37–43). Interpretive research has increased its importance in the information systems field (Walsham 2006).

The research at hand is not positivist research because it does not test theory. It is not critical research either, because it is not trying to change how business actors currently work in the context research, nor does it criticize the current way of working. According to interpretivism, this research framework is a construction
of theory, which helps us to understand the meanings and intentions of the organizations being studied. Our aim is to make generalizations that are bound with our research context.

6.1 Research Approach

Qualitative research methods are designed to help researchers understand people, what people say and do, and the social and cultural context within which people live. In the 1980s, most business disciplines favour quantitative research. (Myers 2009: 5–9). There has been an increased interest in qualitative research in almost every business discipline (Klein & Myers 1999, Myers 2009).

A business and management researcher balances between rigorous and relevant research. Rigorous research is research conducted according to the scientific model of research, is subject to peer review, and is published in an academic journal. Relevant research is defined as research that is of immediate relevance to business professionals. Qualitative research can be both rigorous and relevant research at the same time. Qualitative researcher studies real situations, not artificial ones. To conduct qualitative research, a researcher must actively engage with people in real organizations. (Myers 2009: 13–14).

Both quantitative and qualitative research approaches are useful in business research. Obviously, there are certain advantages and disadvantages in both approaches. Qualitative research is best if a researcher wants to study a particular subject in depth. It is good for exploratory research when the particular topic is new and not much previously published research exists on the topic. It is also ideal for studying social, cultural, and political aspects of people and organizations. A major disadvantage of qualitative research is that it is often difficult to generalize over a larger population. (Myers 2009: 9).

In the research at hand, we want to study value creation of the VAR in the PLM systems context. We also want to determine what kind of business model the VAR has in this context. We want to create an in-depth view of the VAR’s value creation and its business model. The topic is rather new. It has not been studied previously in Finland. There are studies about VARs, but not in the PLM systems context. There are studies about PLM systems but they do not consider the VAR’s role in that context. The qualitative research approach was selected because the topic is rather new, at least in Finland, and because we want to create an in-depth view about the research subject.
6.2 Research Method

Myers (2009) defines a research method as a strategy of enquiry, a way of finding empirical data about the world. The resource problem defines which research method should be used (Hirsjärvi & Hurme 2000). Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena, whereas quantitative research methods were originally developed in the natural sciences to study natural phenomena (Myers & Avison 2002, Myers 2009: 8–24). Action research and case study research are examples of qualitative research methods.

The aim of the research at hand is not to create organizational change and simultaneously study the process as action research does. Case study research is used to establish empirical evidence to convince peers of the applicability of research. We would like to contribute to knowledge about VARs’ business possibilities and value creation in the PLM systems context. (Myers 2009: 71).

6.2.1 An Explanatory Case Study

The purpose of a research case is to contribute to knowledge in a particular field (Myers 2009: 71). Case study is a research method that focuses on one, or at maximum, a few objects (Hirsjärvi & Hurme 2000). Case study is especially applicable when the research focuses on special cases (Hirsjärvi & Hurme 2000) and when a phenomenon cannot be studied outside the context in which it occurs (Yin 2003), as is the case in the research at hand, which is a study of VARs in the context of PLM systems. The purpose of case study research in the business and management discipline is to use empirical evidence from real people in real organizations to make an original contribution to knowledge. A case study can be used to study real life situations where there is no control on the part of the researcher (Myers 2009: 73).

In case study research, the phenomenon of interest is not separated from its context, since the context itself is part of the story. A case study is a research strategy that focuses on understanding the dynamics present within a single setting (Eisenhardt 1989). Yin (2009) defines the scope of a case study as being “an empirical inquiry that investigates a contemporary phenomena within its real-life context especially when the boundaries between phenomenon and context are not clearly evident.” He continues with a technical definition of a case study. Case study inquiry “copes with the technically distinctive situation in which there
will be many more variables of interest than data points and has one result.” It “relies on multiple sources of evidence, with data needing to converge in triangulating fashion, and as another result.” It “benefits from prior development of theoretical proposition to guide data collection and analysis.” (Yin 2009).

Case study research is philosophically neutral. It can be not only positivist as Yin (2003) views it, but can also be interpretive or critical (Myers 2009). The research at hand is interpretive research.

Myers (2009: 76) proposes his own definition for case study research: “Case study research in business uses empirical evidence from one or more organizations where an attempt is made to study the subject matter in context. Multiple sources of evidence are used, although most of the evidence comes from interviews and documents.” He points out that case study research in business almost always involves a firm or an organization. The research at hand involves three VARs in the PLM systems context.

Myers goes on to say that case study research does not normally involve participant observation or fieldwork. Most of the empirical evidence in business case study research comes from interviews and documents. This applies to the research at hand (see Table 29).

Myers (2009) takes the view that the case study definition offered by Yin (2003), which is similar to that noted above, is too broad in one respect and too narrow in another respect. He argues that case studies in business are usually restricted to studies of one or more business organizations. The organizational focus is an important identifying feature of case studies in business disciplines. He also views the definition of Yin (2003) as being too narrow in the sense that he advocates just a positivist type of case study research.

In the business discipline, case study research uses empirical evidence from real people in contemporary real-life organizations. The specific topics vary from current marketing practices to the implementation of ERP systems in the field of information systems. The case study researcher seeks to understand how and why a particular business decision was made, or how and why a business process works the way it does. (Myers 2009: 73). In the research at hand, the real life context is the PLM systems context and real life organizations are the VARs, suppliers, and customers of PLM systems. In general the researcher has not had any control over the situation. But the fact is that the researcher has been a practitioner in the research context. The research data has been collected from the initiatives, where the researcher has not participated. Still there is a possibility
that indirect effects exist particularly in the interpretation of the empirical research data.

Yin (2003) categorizes case studies as explanatory, exploratory, or descriptive. Cunningham (1997) has extended this categorization to include intensive cases, comparative cases, and action research. The case study typology of Levy (2008) consists of idiographic case studies that aim to describe, explain, or interpret a particular case and that can either be inductive or theory-guided, hypothesis generating case studies, hypothesis testing cases, and plausibility probes, which are an intermediary step between hypothesis generation and hypothesis testing, and which include illustrative case studies.

We are developing an intensive understanding of the case VARs in the PLM systems context (Cunningham 1997). The research at hand could be categorized as a descriptive case study (Yin 2003) as VAR value creation in a real-life context of PLM systems is being described. Or this research could be categorized as a theory-guided idiographic case study (Levy 2008), since it is explicitly structured by a conceptual research framework that focuses attention on certain theoretically specified aspects of reality. However, it was decided to define this research as an explanatory case study. The aim was not to be provocative, instead it was desired that an accurate record of events and explanations be provided. The goal is to provide an adequate explanation by comparing the facts of the case VARs with the preliminary research framework (see Fig. 9). (Cunningham 1997). A multi-case design was selected as the research design for the research at hand. The following section gives the rationalization for the research design selection.

6.2.2 A Multi-Case Study with Embedded Units

Case studies can involve single or multiple cases, and several levels of analysis (Eisenhardt 1989). A case is defined as a specific, complex, functioning thing. It is also defined as an integrated system. (Stake 1995: 2). Yin (2009: 53) takes the view that single- and multi-case study designs are variants within the same methodological framework. A multi-case study is considered more compelling and the overall study is therefore regarded as more robust (Yin 2009). Selecting between a single-case and multi-case study must be done with the aim of maximizing what can be learned in the period of time available for the study (Paré 2004).

Our rationale for choosing a multi-case study of VARs of PLM systems is that it yields more general results than a single case study (Benbasat et al. 2002),
it allows for the option of conducting both a within-case and a cross-case analysis (Baxter & Jack 2008), and it is more applicable when the intent of the research is description, theory building, or theory testing (Benbasat et al. 2002). This is appropriate since the goal at hand is to adequately explain the VARs’ value creation in the context of PLM systems.

The basic design types available for multi-case studies are the holistic design and the embedded design. In a holistic case study, the case is studied as a whole; in an embedded case study, multiple units of analysis are studied within a case. (Yin 2003). Whether to construct a study consisting of two or more cases using a holistic design or an embedded design depends on what is defined as the context and research goals. In the research at hand, the three business actors in the PLM systems context i.e., the VAR, customer, and supplier, are considered to be three units of analysis in an embedded multi-case study. The context of the case studies is the PLM systems business environment in general and the research goal is to study a VAR’s business model within this context, the added value that a VAR creates for its suppliers and customers in this context, and how the value is created. If the context had considered specific VAR companies, they would have been seen as multiple separate holistic cases. (Runeson & Host 2009).

The research at hand included three VAR companies, five customer companies, and five supplier companies. The description of the units of analysis selection process and a short presentation of the units are noted in the following section.

6.2.3 Case and Unit of Analysis Selection

Yin (2009) states that in a multi-case study the case selection should be done using replication. Flyvbjerg (2006) adds that selection should be intentional. Here, a literal replication is used. As we have prior knowledge of the outcomes (Paré 2004), we expect to see similar results from each case because our research context is limited to the PLM systems context only (Yin 2009). Flyvbjerg (2006) adds that improvement of the generalization opportunity of a case study can be done through the careful selection of cases. He points out that it is more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and how frequently they occur.

Three VAR companies were selected (see Appendix 4) all of which share a common PLM system platform supplier. Product and service offerings of these
three case companies (VARs) are different. All three case VAR companies are small or medium-sized Nordic-based companies that also have global operations, either through their own operations or through customer operations. However, their product and service offering is located in a different domain than their PLM system platform supplier’s product offering spectrum. A more detailed description of the case VAR companies can be found in Appendix 4.

The case is referred to as the object of the study and in the research at hand this is the VAR within the PLM systems context (Runeson & Host 2009). A case may include one or more units of analysis, i.e., an embedded case study (Paré 2004, Runeson & Host 2009, Yin 2009). Each unit of analysis must be as specific as possible. It should be a bounded system and related to the initial research question. Literature must be used as input when defining the unit of analysis (Paré 2004). The research at hand has three units of analysis, i.e., the three business actors of the preliminary research framework (see Fig. 9). They are suppliers, VARs, and customers. Literature has been used to define the units of analysis and each refers to the research question (see Section 1.2). They are all specific, do not overlap, and are all bounded systems because they are all single companies.

From the customers of the three case VAR companies, five companies were selected (see Appendix 4) representing different industrial sectors and different company sizes. Customer company size varies from small and medium-sized Finland based companies to large global companies. They were also each at a different stage of their PLM journey. Some of the companies were at the beginning of their journey, i.e., in the middle of their first PLM implementation. Some of them already had a few years of PLM usage experience and were planning functional extensions to their PLM systems. The most mature company had over ten years of PLM system usage experience. The company was planning its PLM system upgrade at the same time that it was fine-tuning its PLM usage process and organization, as well as its cooperation with the VAR and supplier companies.

In addition to the common PLM system platform supplier, we selected four other supplier companies among the suppliers of the three case VAR companies (see Appendix 4). The suppliers offered different types of products and services to the case VAR companies. One supplier was a mere service company. One company, although it had its own product offering, offered services to the case VAR companies. The supplier companies were all small and medium-sized companies. Three of them conducted business globally, the rest focused only on
Finnish markets. The PLM system platform supplier is a global company and uses both its own direct channel and the VAR channel to deliver its products and services to its customers.

6.3 Research Process

According to Yin (1994: 45–49) single- and multi-case studies share the same methodological framework. Each individual case study in a multi-case study is a whole study that includes actually conducting the case study and writing individual reports for each study. Yin defines a case study method that consists of three steps: (1) define and design, (2) prepare, collect, and analyze, and (3) analyze and conclude. In the research at hand we adopt the case study method of Yin (1994) as a basis for our research process, which is presented in Fig. 10.
Fig. 10. Research process of the research at hand (adapted from (Yin 1994)).
During the define and design step, the research problem was defined (Chapter 1). The preliminary research framework was established (Chapter 5) based on the literature review (Chapters 2, 3, and 4). In parallel with the development of the research framework, the research cases were defined and selected (Section 6.2.2). The research is a multi-case study with embedded units and the unit of analysis (Section 6.2.3) was selected concurrently with the two preliminary research interviews (see Table 29).

The prepare, collect, and analyze step consists of empirical data collection from each of the three cases (Section 6.3.1) as well as within-unit analysis of all three cases (Baxter & Jack 2008) (Section 6.3.2). During the last step, analyze and conclude, a cross-unit analysis (Baxter & Jack 2008) (Section 6.3.2) was completed. The preliminary research framework (see Fig. 9) was reviewed against the analysis findings and the corresponding modifications were made (see Fig. 16). Finally, the results and their implications are discussed.

### 6.3.1 Empirical Data Collection

The choice of one or more data collection techniques depends on the research problem (Hirsjärvi & Hurme 1995, Myers 2009: 25), research method, and the availability of data (Myers 2009: 25). Case studies typically combine data collection methods, i.e., interviews, questionnaires, and observations. The evidence may be qualitative, quantitative, or both. (Eisenhardt 1989). Case study researchers in business and management rely primarily on interviews (Myers 2009: 25). The empirical data of the research at hand was obtained mainly from interviews, but it was supplemented with the results of customer surveys of two of the case VAR companies and emails from informants (Myers 2009, Walsham 2006).

Qualitative data is comprised mostly of records of what people said, e.g., from the different types of interviews (Myers 2009: 8). The interview is seen as an efficient (Eisenhardt & Graebner 2007) and flexible scientific data collection method that can be based on many starting points in research and is suitable for many purposes (2000). The interviewer’s role is to activate and steer the interview. On the other hand, an interviewee must be able to trust that the interview will remain confidential. This means that the information collected during the interview must be treated as confidential information. (Hirsjärvi & Hurme 1995).
In the research at hand, a semi-structured interview theme was used (Eskola & Västamäki 2001, Hirsjärvi & Hurme 1995). The themes of the research interviews were derived from the preliminary research framework (see Fig. 9), which focused our empirical data collection (Yin 2003). The themes were predefined to improve the quality of the empirical data (Hirsjärvi & Hurme 2000). The themes of the research interviews are listed in Appendix 2. Two preliminary interviews were conducted (see Table 29) to test the outline of the interview, the order of the themes within it, and the formulation of the interview questions (Eisenhardt 1989, Hirsjärvi & Hurme 2000).

In addition to the two preliminary interviews, 18 research interviews were conducted. Their length varied from 23 to 71 minutes. All interviews were tape-recorded and were later transcribed verbatim. The interviews were either Face-to-Face (F2F) or phone interviews. One research interview was conducted as a group interview with two informants. The interviews were done either in Finnish or English.

We interviewed numerous, highly knowledgeable informants who view the scope of the research questions from diverse perspectives as is required in an in-depth case study. The informants came from different organizational positions and geographies. (Eisenhardt & Graebner 2007, Myers 2009). The informants were from Finland, Sweden, Germany, and the USA. They are representatives of the case VAR companies as well as the common PLM system platform supplier of all case VAR companies. Representatives of other types of suppliers were included, as well as representatives of customers of the case VAR companies. The list of informants is presented in Table 29.

Employees from the supplier companies were selected and it was expected they would have a good understanding of the company’s business goals, product and service offering, and about the company’s value creation process. It was for this reason that representatives of the PLM system platform supplier were selected. In addition, both employees are responsible for the supplier’s VAR channel related activities. Because all suppliers were either small or medium-sized companies, it was determined that the CEO of the supplier company would have the best view of the company’s business goals and offering. (Myers 2009).

The representatives of the case VAR companies are all management level employees, e.g., CEOs, directors, and managers. They are all responsible for the business, the business development, or both. The representatives of the customer companies have the widest variation of all informants with regard to their organizational positions (roles) and responsibilities. Some representatives are
responsible for the selection and implementation of the PLM system and related services. Some are responsible for use of the system and services. Some informants are responsible for steering and future development of customer PLM systems. (Myers 2009).

The original themes of the research interviews came from the preliminary research framework presented in Fig. 9. As the research at hand is a multi-case study with embedded units, the original themes were used as a basis for creating specific unit of analysis themes. These themes are listed in Appendix 2.

6.3.2 Modes of Empirical Data Analysis

In this section, a brief presentation is made of the empirical data analysis strategy and the techniques used in the research at hand. Myers & Avison (2002) argue that it is more accurate to speak of ‘modes of analysis’ in qualitative research than of ‘data analysis,’ because it is assumed from a hermeneutic perspective that the researcher’s presuppositions affect the gathering of the data, the analysis affects the data, and the data affects the analysis in a significant way. The research at hand adopts the preceding view.

In general, cases are units of analysis. In the research at hand, it was determined during the define and design step of the research that a VAR in the PLM systems context would be a case for the study. (Patton 2002: 447). There are three case VAR companies. In addition to the case, we determined that there were three business actors that could be used as embedded units of analysis. These are the suppliers, VARs, and customers. These units of analysis were identified based on the preliminary research framework.

One danger associated with the analysis phase is that each data source would be treated independently and the findings reported separately, which is not the purpose of a case study. Rather, the researcher must ensure that the data are converged in an attempt to understand the overall case, not the various parts of the case, nor the contributing factors that influence a case. (Baxter & Jack 2008).

To summarize the preceding discussion Fig. 11 gives a step-by-step definition of the research process from the case and unit of analysis selection (see 6.2.3) through the informant selection, the research interview theme definition, and the empirical data collection until the transcription of the interviews (see 6.3.1).
Fig. 11. Detailed research process steps from the case selection until the interview transcription.
Within-Unit Analysis

Within-unit case analysis typically involves case study write-ups for each unit. These write-ups are often simply pure descriptions that help the researcher cope with large amounts of research data early in the analysis process. There is no standard format for such analysis. The overall idea is to become intimately familiar with each case as a stand-alone entity that later accelerates cross-case comparison. (Eisenhardt 1989). Instead of completing case write-up, the write-ups of the research at hand are used as write-ups of main nodes and first level children nodes of the research coding scheme (see Table 30). Case VAR companies share first, a common PLM system supplier, but also some suppliers and customers. It is almost impossible to differentiate informant views according to case VAR companies, which would have been an alternate way to make the within-unit analysis. Although the coding scheme includes the PLM systems context as a node, it is not included in the cross-unit analysis. There is a write-up about the PLM systems context only to give an overview about the context in which the case VAR companies are operating. Introduction of case VAR companies can be found in Appendix 4.

First deductive analysis was used to organize the empirical data according to the code scheme (Patton 2002: 454). An initial data-coding scheme was created (node three and level 1) based on the preliminary research framework (see Fig. 9) (Paré 2004, Patton 2002: 454). The coding was done using NVivo 9 research software. It was done in two rounds. During the first coding round, the audio interview recordings were reviewed and this was followed by transcription of each interview using the NVivo 9 program, and finally, the initial coding was completed based on both the recordings and transcriptions.

During the second coding round, inductive analysis was used to make sure that the coding was at a sufficient level for further analysis (Patton 2002: 454). The interview summary of each code from the scheme was read. Additional detailed codes (level 2) were added where it was felt they were needed in consideration of further analysis (Paré 2004). The complete coding scheme is presented in Table 30.

The inductive analysis was continued in order to determine patterns from the empirical data (Patton 2002: 453). From each unit of analysis, each empirical data
summary of each code from the coding scheme was further analyzed. The findings are reported in Chapter 7.

Cross-Unit Analysis

The cross-unit analysis was completed to enhance the generalizability of the research results, to deepen understanding and explanation (Paré 2004), to find within-unit similarities and inter-unit differences, and to search for patterns (Eisenhardt 1989). The cross-unit analysis was used to seek a chain of evidence for the relationships studied on the basis of the research framework. The use of cross-unit analysis is done to avoid reaching premature and false conclusions due to poor research data processing (Eisenhardt 1989).

In cross-unit analysis, the tactic used was to select categories from the preliminary research framework (see Fig. 9) and to look for within-category similarities and inter-unit differences between units of analysis (Eisenhardt 1989, Myers 2009). Categories in the research at hand are the elements of each business actors as well as the elements between the business actors. The goal for using cross-unit analysis is to determine whether there are views about the categories that are consistent or divergent, and if there are divergent opinions about the reasons for the different opinions.

During the within-unit analysis and the cross-unit analysis the analysis findings were constantly compared to the preliminary research framework (see Fig. 9). As a result of this iterative process, the research framework was modified according to the findings made during the analysis phases. (Eisenhardt 1989). The revised research framework (see Fig. 16) and reasoning for the modifications are presented in Chapter 8.

To summarize the preceding discussion Fig. 12 gives a step-by-step definition of the research process from the detective analysis through the within-unit analysis and the cross-unit analysis until the comparison to the preliminary research framework and the revision of the research framework (see 6.3.2).
Fig. 12. Detailed research process steps from the deductive analysis until the revision of the research framework.
7  Empirical Data Within-Unit Analysis

In the following sections, the results of the within-unit analysis are documented. When direct citations of the research interviews are used, the informant’s role and number and the year the interview was conducted are included at the end of the citation. If the cited interview was originally done in Finnish, it has been translated into English as precisely as possible, taking into account the researcher’s then current knowledge of English. For information confidence and data security reasons, the actual company names in the citations have been replaced with generic names, e.g. PLM system supplier, supplier X, supplier Z, etc.

The sections are presented according to the preliminary research framework (see Fig. 9). Within each section, a more detailed grouping has been used based either on the preliminary research framework definition or on coding during the analysis phase (see Table 30).

7.1  PLM Systems Context

Although more people and companies are beginning to realize the value and possibilities of PLM, PLM systems markets are seen to be challenging and expected to become even more challenging in the future. An informant believes that in the future, PLM systems will be the biggest solution area among enterprise solutions. It will be even larger than ERP systems are today.

The PLM systems context is a global market that is under continuous change. Customers are changing their business models according to their own business requirements. In addition, it is expected that a certain part of the software business will become on-line business.

Product offerings in the PLM systems context are broad. They vary from single point systems to platforms, and from products targeted to SME to very large systems more applicable to large companies. Requirements vary not only between customers, but also internally within a customer. A customer has internal requirements that can be fulfilled using a platform type of system, but there are also requirements that could be solved using a point system. What to solve with what causes confusion among customers. Customer requirements in the PLM systems market have changed over the last ten years. Earlier, customers required that systems fully support their own processes. Today, customers are more flexible and are more willing to accept the standard processes built into PLM
systems. Still, customers expect that the user interface of the PLM platform is uniform through and through. They also expect that its usability be high.

Major PLM system platforms more or less all present the same functionalities and capabilities. The challenge for the VAR in this context is to find a way to differentiate itself from its competitors. Selling PLM systems is no longer just about selling mere products and services. It is more about selling relationships, added value, and know-how.

“... we have closed deals with the way that the customer has not seen the whole system before it has signed the contract. ... There we sold value add and know-how.” (VAR 1, 2011)

Although competition in the Finnish PLM systems market is seen to be tough, the PLM market is not seen to be a thoroughly mature market. There is growth potential in the SME sector.

“... this is a market, where there is lot of potential among small and medium-sized industry ... To be able to be market leader at PLM markets, one has to master the top end1 from enterprise sector, ..., and also the medium-sized enterprise sector ... I would say that there are less than 200 companies [in Finland], which uses PDM-system or PLM-system, as it is called nowadays. ... And where is the biggest opening is this kind of medium-sized industry.” (VAR 1, 2008)

The PLM systems context is highly service-oriented. Competitors, like other suppliers and VARs, tend to copy each other’s working practices. In addition, ERP system suppliers are trying to expand their business toward PLM markets. It is seen as a challenge to the VARs’ business.

“According to feedback from our customers some time ago we were the only one, who offered this type of service. Now also the others have learned it. So it happens very fast.” (VAR 1, 2011)

The PLM systems context has supply and delivery networks. The connecting thread between these two networks is the VAR. The VAR is a member of its PLM system supplier’s ecosystem, but at the same time the VAR is also a member of its customers’ delivery networks. In the supplier’s ecosystem, the VAR can be considered a hub, because it may be more richly connected than the other nodes.

1 Informant refers to the size of a company. Size is measured by revenue.
When viewing it from a customer’s point of view, there is a customer-specific delivery network in which members cooperate with the customer in general, but cooperate with only the VAR in the focal customer case.

### 7.1.1 Supply Network

A distinctive feature of the PLM systems context is that a PLM system supplier does not like to be seen as a service provider. It would like to be seen as an IT and software provider. The PLM system supplier has a service organization that is skilled, but rather small in size.

When selecting VARs, the PLM system supplier tries to find companies that are specialists in their domain or have specific industry knowledge. A company can be a specialist in PLM related business processes, which means that they are capable of going into the customer-company to identify the business needs for process changes and process documentation. Another type of specialization is good engineers in a special industrial sector. When a PLM system supplier finds a suitable VAR candidate with skills that exceed minimum standards, it tries to tie the company into itself. It builds a strategy together with the VAR candidate for a specific part of the market. The supplier avoids having ten VARs doing exactly the same thing. Instead, it tries to select uniquely specialized VARs so that they complement each other rather than compete for the same business.

A PLM system supplier encourages its VARs to partner with each other in certain situations. Sometimes this works, but it has proven to be quite a complex situation since many times the skill sets of the VARs overlap. There are customer cases where several VARs work for the same customer, but do not necessarily cooperate much. It is easier to separate between industries than within the same customer account. A PLM system supplier expects its VARs to cooperate rather than specialize in a variety of application modules that the supplier provides.

“It is important to co-operate with partners, which are involve in the same business. It is better to cooperate even if they seem to be competitors. In some cases we might be competitors and in other cases we are more or less partners.” (VAR 2, 2008)

VARs cannot use whatever types of actors exist in their supplier network, because PLM is always a strategic topic for customers. On the other hand, a VAR needs to make sure that the business it does using its supply network is profitable in the long term for all partiers.
“I think, as I said, very important is the trust in each other, and a clear statement that there's no competing situation, there is a win-win situation, that is important base for further relationship with VAR, I think in both directions.” (Supplier 3, 2011)

7.1.2 Delivery Network

The VAR is a member of its customers’ delivery networks. The VAR as a company is seen as a solution provider to its customers. They are selling products and services such as consulting to their customers. Customers expect their suppliers to deliver services in cooperation. They even require the VAR to cooperate more closely with its rival companies and suppliers of different system domains. A PLM system VAR should have at least an open communication channel to the ERP system VAR or to the ERP system supplier. Customers want to be assured there is integrity between the systems and between the deliverables.

If the PLM system supplier has an active role in the customer’s delivery network, the VAR will remain the main supplier for the customer. It creates credibility for the VAR’s operations. Pioneering companies put weight on this aspect.

Customers want to benefit from market conditions and gain cost savings. The customer wants to avoid a situation where it puts all its eggs into one basket. When the customer gets more experience in the PLM system and its implementation, it may include specialized suppliers in its delivery network. They are often low cost suppliers dedicated to SW coding and configuration. A customer may buy special services such as project management from another specialized supplier. As the customer becomes more mature from the PLM point of view, its knowledge and understanding of the PLM rises to a level where it can create concepts from ideas without any help from the VAR. The VAR’s role in this setup is to demonstrate, create, and deliver high value services.

“In my opinion VAR X’s role is decreased as at the moment we have so much in house know-how. But in a situation when there is a problem peak they’re are ready to meet us halfway.” (Customer 7, 2011)

2 Informant refers to a VAR.
7.1.3 Context Elements

The economic recession period has affected VAR business as it has all other businesses. Changing legislation exerts constant pressure on the PLM system supplier and other suppliers to follow the changes and upgrade their product accordingly. Legislation influences suppliers as well. PLM systems, especially PLM system platforms, are categorized as high-technology products, the export of which is legislation-regulated.

ERP systems (many times SAP systems), are often the *de facto* internal company standard to which the PLM system must be integrated. The challenge is how to integrate PLM systems with ERP so that this system of systems supports the company’s business processes in the best possible way. There are also industries that have industry-specific common IT systems to which the PLM system must be integrated. An example comes from the Finnish F&B industry, where SINFOS, a centralized product content and nutrition database, is the *de facto* system. The other examples are sales configurators that car dealers use. These systems use product data from the supplier’s PLM system.

“When we talk about big businesses so there is always SAP, it is *de facto*. Then there is this interface, how it is done together with SAP in a smart way. Frankly I have not seen it yet. I believe it is doable. Someone might have it but we do not have it, at least at the moment.” (Customer 8, 2011)

Informants see the system of higher education as a source for finding knowledgeable employees. VARs are regarded as interesting employers because they can offer an interesting working environment and the opportunity to work with top-ranking companies. Employees of suppliers have completed various levels of university study while working for suppliers. Some of them even have a part-time teaching position at a university or another type of educational institute. Also, some level of research cooperation exists. Other types of cooperation with public bodies are more limited because of a lack of time and resources.

An informant sees that inside Finnish universities there is much understanding and knowledge about PLM and that they play an important role in how people see the world. He also includes universities as part of the PLM systems context. Another informant sees that public bodies like industrial interest groups might play an important role in overall information sharing about PLM and its possibilities within industrial sectors. There are mixed views among the informants about VAR cooperation with public bodies. Company strategy and
product and service offering seem to drive the cooperation. If the offering is more focused on traditional parts of the PLM, such as PDM, the amount of cooperation with public bodies is smaller than if the offering is focused on the more immature part of the PLM (i.e., digital manufacturing).

7.2 Suppliers

There are several different types of suppliers to VARs in the PLM systems context. A supplier type develops and delivers the PLM system platform. Another supplier type delivers smaller products and product components that completes or extends the functionality of the PLM system platform. One supplier type delivers either services or resources or both to the VAR. A supplier can also be a peer company of a VAR, which means that a VAR has a supply relationship with another VAR of a common PLM system supplier.

A PLM system supplier may be a global company with a product that is a platform type of product targeted at the high-end of PLM markets. In the SME PLM markets, the PLM system supplier base has more variation. The companies that have a platform product also compete in SME markets. And, there are different types of exclusively PDM and CAD system suppliers and other types of niche players.

A PLM system supplier might have a multi-channel strategy sales model, but it can also have a subsidiary company network. In a multi-channel sales model, one channel is for direct sales to customers and another channel uses VARs and other resellers to sell the same products through a direct channel. A supplier may also have product-specific channels. Determining to which channel a customer belongs can be based on customer size, global presence, or whether the customer has something special that interests the supplier (e.g., the customer represents an industry). The channel choice will either be strategic for a supplier, or simply the direction in which the supplier wants to expand.

A VAR may have other global company suppliers besides the PLM system supplier. They are usually component suppliers, such as database suppliers. There are system integrators that act as suppliers for a VAR, even the big ones, although in many cases they compete with the VAR. It may also cooperate with different types of IT service companies. If a VAR has its own R&D, it may have different types of technology providers that act as suppliers.
“There might be these big system-integrators like Supplier A etc. But on the other hand they are our competitors. Then we have smaller companies, like Supplier R and Supplier E, which are this type of one-man-companies, which we use. Then we have Supplier C as a supplier, which is also our main competitor. We buy from them different type components. In that sense they are our tough rivals but on the other hand they are good suppliers too." (VAR 5, 2011)

Summary

The following list of a VAR’s suppliers in the PLM systems context summarizes the findings of the preceding within-unit analysis of the empirical data:

- PLM system supplier, which owns the PLM system platform.
- Product supplier, which offers products to complete or extend the PLM system platform.
- Service supplier, which offers coding, configuration, training, consulting, etc., types of services.
- Resource supplier, which offers resources to a VAR’s customer projects.
- Peer is another VAR of a common PLM system supplier.
- Component supplier, which offers database etc. products.
- Integrator, which offers integration services.
- IT-service supplier, which offers IT-services, likes SaaS.
- Technology provider, which offers R&D related services.

7.2.1 Supplier Offering

A PLM system supplier targets its product offering to certain predefined markets or industries, the requirements of which it tries to cover as extensively as possible. It would like to offer industry-specific, pre-packaged, and validated solutions to its VARs to enable quick implementation of the solutions to the VARs’ customers.

“That's why it's important that we have pre-packaged and, solutions that are validated and ready to use. So it becomes quite quick implementation with a known result already upfront when you quote something.” (Supplier 6, 2011)

3 Informant refers to a global system integrator.
A PLM system supplier may have a product family that includes the PLM system platform product, but also includes other products that complement the actual functionality of the platform. It may even have several platform products that are targeted to cover different parts of the whole PLM concept. For example, it may have one platform for the basic PLM functionality (e.g., part and structure management, engineering change management, etc.) and another platform for digital manufacturing.

If the supplier’s PLM platform is configurable, it provides the ability for a VAR to develop business both inside and outside the PLM standard processes. Another type of PLM system supplier product is more of an engineering tool that allows building automation around the creation processes of engineering, but the majority of the functionality comes as a pre-packaged out-of-the-box solution. The VAR business opportunities are more related to engineering services around that tool, providing specialist knowledge. The third type of product is a standalone platform such as CAD tools, a stand-alone tool, or a platform for special purposes. It allows VARs to develop their own libraries in the open architecture inside the product.

A PLM system supplier offers direct business opportunities to its VARs. It may ask a VAR that has either special knowledge or particularly good experience and knowledge from a certain industry to deliver certain services as part of its own customer project. A VAR’s service offering may be part of the PLM system supplier’s offering or the supplier may outsource all or certain parts of its customer support to its VAR. The PLM system supplier may offer a marketing and sales channel for the products of its VARs through cooperation with other VARs or through the e-market place.

A PLM system supplier’s service offering is targeted to its larger customers. The support services that the supplier offers to its VARs are significant. The service offering includes training to use the platform and related tools to generate business. It includes marketing and sales support. The PLM system supplier provides technical resources to solve technical issues of a sales case, or management level resources to convince a customer of the superiority of a VAR’s sales proposal. The supplier has technical product support. It shares information through the Internet or the results of market surveys. It organizes marketing events to boost its VARs’ business and to give them an opportunity to create contact with new, potential customers.
“So, our service offering to the partner is really to train them so they are efficient in using our tools, so they themselves can go out and sell to their customers and train their customers.” (Supplier 6, 2011)

Suppliers, excluding PLM system supplier product and service offerings, are mainly project specific. Suppliers offer additional services on top of or to complement a VAR’s own service offering. The offering might be the whole implementation project for a customer, only training, or coding and configuration services. The supplier offering may consist of components like a database, or it may be related to IT service like SaaS. It might be resource selling, or it may offer special skills and knowledge, ready-made building blocks, or extensions to the VAR’s own product. The skills and knowledge are enablers for reusable or generic software code, or for easing the customer’s system maintenance, especially in the case of upgrading the PLM system platform. A supplier can offer very specialized technical or technological skills to the VAR, either for use in its own product development or for use in customer projects to complete very specific or advanced customer-specific configurations of the PLM system platform. As integrations between the PLM systems with other systems are an essential part of a VAR’s business in the PLM systems context, an R&D supplier may offer special skills and knowledge for creating or completing configurations to existing integrations between the PLM system and other systems or between the PLM system and enterprise application interface platform.

**Summary**

The preceding within-unit analysis of the empirical data is aggregated into the list below. It lists the content of the supplier offering in the PLM systems context:

- PLM system platform,
- Complementary products, which complement or extend the functionality of PLM system platform,
- Engineering tools,
- Standalone platforms,
- Business opportunities,
- Sales channel,
- Product and tool trainings,
- Technical product support,
- Information sharing.
– Marketing and sales support,
– Coding and configuration services,
– Resources,
– IT-services, and
– Component products.

7.2.2 Supplier Business Goals

The PLM system supplier has a strategic focus on certain industries. The selection of the focus industries can be based on a combination of historical reasons, successful customer cases, or it can be a just a strategic decision. The PLM system supplier’s clear business goal is to grow in all business areas in which it has a presence and to extend its presence into new industries that currently are either not using PLM systems at all, or where the usage is minimal. Its target is to build on top of the basic technology support for industry-specific business processes. Like the PLM system supplier, the business goals of other suppliers will also be to grow their business.

“We wanna, of course, grow in our existing area, automotive and aerospace, but we have also clear focus to grow rapidly in other industries where we are right now, not have this high number of customers or this market share.” (Supplier 3, 2011)

A supplier’s business goal might be to move from being a mere service company to become a product producing company. A supplier may concentrate on a certain market segment (e.g., pharmaceutical, F&B, or CPG), which has industry-specific requirements on top of basic PLM requirements.

“There are sales issues as well, because we have expanded the scope of PLM to include not just engineering and manufacturing, but also to include quality and regulatory.” (Supplier 4, 2011)

A supplier’s business goal might be to become an independent actor in markets to enable it to serve several VARs regardless of the identity of the VAR’s PLM system supplier. A supplier’s strategy may be to create new business opportunities by servicing existing customers as well as possible. For them, the belief that good news quickly spreads by mouth is a reality.
7.2.3 VAR-Supplier Value

This section has been grouped according to the analysis coding (see Table 30) originally from the preliminary research framework (see Fig. 9). It was developed further during the within-unit analysis phase to achieve a deeper empirical data analysis.

Supplier-Created Value

The PLM system supplier is a global company. It is well known among the VAR’s customers and customer candidates, especially among large companies. Being a representative of a market leader creates value. The product offering and support standards of the PLM system supplier appeals to potential customers of a VAR.

“So, I would say that our value proposition is that for them, they get a chance to work with the market leader and sell the market leader’s solutions, with good margin to grow their own business and to become specialists in a specific area.” (Supplier 6, 2011)

A VAR sells a platform product to its customers and can be assured of continuity and continuous improvements because of the substantial investments in development made by the PLM system supplier. In general, the PLM system supplier’s PLM system platform enables a VAR to create a complete solution for its customers by adding its own or its suppliers’ value added products, or both, to the platform. The complete product offering acts as a market differentiator.

“So, a lot of the time it is possible for the VAR that is using our software, or selling our software, also to build a content of their own, to add, to differentiate themselves from the competition.” (Supplier 6, 2011)

The PLM system supplier may offer a marketing and sales channel for its VAR’s products through cooperation with other VARs or through the e-market place. A VAR can use the customer references during the sales phase to convince new customers about the superiority of the VAR’s sales proposal. If a PLM system supplier does not have its own service organization or the organization size is small, then it may offer service business opportunities to its VARs in its own customer projects, or it may outsource its support and maintenance services entirely or partly to a VAR. When looking for new business opportunities inside a new industrial sector, a VAR may exploit the business relationships of its
suppliers because they may already have reference customers from the same industrial sector.

The Supplier creates value through its knowledge. A supplier’s value creation is related to its special knowledge, which may be either complementary or an extension to the VAR’s knowledge base (i.e., special knowledge or deep knowledge about a certain industrial sector). A supplier can create value for a VAR by introducing and guiding the VAR into these industry-specific requirements and making sure that the VAR’s services, such as a deployment project, are delivered with success and according to the specific requirements.

A PLM system supplier creates value for its VAR if it provides resources to support the VAR’s sales organization. Resources can be technical resources to solve technical issues of a sales case or they can be management-level resources to convince a customer about the superiority of the VAR’s sales proposal. The cooperation of a VAR with its suppliers may be in the form of joint resources that create a substantially sized resource pool.

A self-innovative supplier creates something that completes or extends the functionality of a VAR’s own product, which creates value for a VAR. As a result of this type of R&D cooperation, a new product and service concept that completes the VAR product and service offering toward its customers is developed, and which is more appealing to customer, or creates other VC. The concept adds flexibility to a VAR’s offering.

“I also believe that we have the opportunity where we could partner on delivering more product X, where the supplier A could do some services on top of product X, but also the supplier A has reusable components that could be considered as components to product X.” (VAR 1, 2011)

The preceding within-unit analysis of the empirical data is aggregated into the list below that indicates the sources of the supplier-created value in the PLM systems context:

- Company and product brand,
- PLM system platform,
- Additional sales channel,
- Customer references,
- New business opportunities,
- Knowledge,
- Resources,
– Extended market presence, and
– R&D cooperation.

Supplier-Perceived Value

A network of VARs extends the supplier’s market presence.

“It would be very hard for us to put 380 engineers and, sales engineers and presales engineers on the streets, in Nordic. That's the network we have, it's around three hundred and.. Somewhere between 350 and 400 engineers, and salespeople, that are walking the streets every day talking about our software and selling our software.” (Supplier 6, 2011)

A VAR is closer to the customer than its PLM system supplier. Closeness in this context does not only mean physical closeness, but it also means knowledge about customers and markets. A VAR collects feedback and requirements from its customer base and delivers it to the supplier. If a VAR is focused on a certain industry or industries, it has an even deeper knowledge about it than the PLM system supplier has. In some cases, the VAR can even be more agile than a big supplier. One example of business agility is how fast a VAR reacts to customer requirements compared with the corresponding time spent by the PLM system supplier. Even though a VAR and its PLM system supplier has an open communication channel, it might be hard to get a specific customer requirement prioritized high enough in the supplier’s R&D organization.

“Instead of couple of industries, you could have a 111 industries, without being involved. You could have VARs and experts in that one industry, then are able to engage in their tool and deliver solutions that meet the exact requirements of the specific industry. Or a specific geography within industry.” (Supplier 4, 2011)

Although in general a PLM system supplier is a big global company, it cannot do it all by itself and it cannot master all the markets in which its PLM system platform is available for use.

“All they know is what are the capabilities of their platform, what capabilities are required for the applications to run, and what they need to do to serve entire applications, that there are written and recordings with platform requirements, so they can play well on the platform. On the other
hand, application providers don’t need to know all the requirements that make the platform go. They just need to understand the actual business proposition, the business value that they’re providing for that specific application. I think that’s an excellent model of what is the VAR versus supplier relationship should be…” (Supplier 4, 2011)

A VAR creates value for a supplier through its own product offering. It may create business possibilities for a supplier by creating something new as an add-on to the supplier’s product or a new use of the product, or an improvement to the supplier’s product that comes through integration of its own product. A VAR’s own product and service offering complements not only the PLM system supplier’s product and service offering, but other suppliers’ product and service offering as well.

A VAR may strengthen and complete a supplier’s business functions. In maintenance services, the VAR’s role is to act as a filter, filtering the most obvious service requests and only forwarding the most serious ones to the supplier’s maintenance service organization. A VAR may perform product quality assurance functions, adapt a product for new industries and customers, deliver a product to new customers, industries, and geographies, and perform overall marketing functions, all of which creates value for suppliers. Cooperation with a VAR may be a way to differentiate an organization from competitors in the market. A VAR creates value for the supplier by being a reference to a supplier or by allowing a supplier to use common customers as references for a supplier.

“… we help them to open up new markets, we help them to open up new clients, we help them sometimes to quality assure their products, because they might have released them too quick to the market. We help them to understand how to use the product (in a way). Then, you have obviously the distribution that we are, we help them to sell the products in a, to a specific industry or to a specific geography. And also I would say, the promotion part. Promote their offerings, their marketing and, and also, usually we have a lot of requests for references, so we have a pretty happy customer base. So, also we see some of the suppliers that would like to do, or spread these stories globally, to help them to sell in other regions.” (VAR 3, 2011)

The preceding within-unit analysis of the empirical data is aggregated into the list below, which indicates the sources of the supplier-perceived value in the PLM systems context:
Extended market presence,
- Market and customer knowledge,
- New business opportunities,
- Feedback loop,
- Business agility,
- Product and service offering,
- Customer gateway,
- Market differentiator, and
- Customer references.

7.2.4 Supplier-Customer Business Relationship

Even if a PLM system supplier is involved in the customer implementation project, the real business relationship is between the customer and a VAR. The main and daily communication channel is from the customer to a VAR and onward to the supplier. A customer may feel that the PLM system supplier is both mentally and geographically too far from its daily business. A supplier’s role is to be in the background and ready to react if something happens on the project that requires supplier attention. Large companies preferably buy their PLM system software licenses directly from the PLM system supplier. They tend to have framework agreements with large service suppliers. Customers use the suppliers directly, which are also VAR suppliers because they are looking for lower service costs and because they want to extend their supplier base.

7.3 VAR

Informants view the VAR as a company that is a solution supplier for its customers. Through flexibility and customer business understanding, it can help customers achieve their targets. Customers expect that a VAR will demonstrate its offering, ideas, and concepts of how the customer can solve its business problems. A customer, especially a small customer, feels that it has a better possibility of getting support from a VAR than from a global supplier or from a non-local VAR. It means the VAR will sell products and services, such as consulting, to its customers. The VAR can be seen as a courier, a system integrator, a reseller, and a product company.
“In fact we get our living from that we are capable of adjusting the supplier’s product so that the customer feels that it is a solution for them. Sometimes it requires R&D activities, sometimes it requires repositioning of the product, like doing the marketing communication to the customer in a right way.” (VAR 2, 2011)

The difference between a VAR and an integrator is clear; a VAR can sell products, an integrator cannot. Integrators can work with multiple platforms, VARs cannot.

“... difference between the two is that on a basic level, a VAR can sell products and an integrator cannot. So a VAR can have integrator capabilities and can have consulting staff ... I think one more difference is that many integrators can have a multiplatform strategy. Where you can work on multiple platforms. When you become a VAR, it does not conclude that, but it makes it more difficult. Because now you have a much closer relationship with one platform provider than another.” (Supplier 4, 2011)

VARs are usually specialists in their domains (e.g., they may be specialized in the business process of the PLM), which means that they are capable of going into customer companies and identifying their business needs for process change and process documentation. Or a VAR may have very good engineers for certain industries. VARs have skills that exceed industry standards. They are best in specific segments. When a PLM system supplier adds new brands or products to its portfolio, it needs to look for new specialists in those areas.

From the point of view of the PLM system supplier, it’s VAR will form a network that extends its presence in the markets and create new business possibilities. When searching for VAR candidates, a PLM system supplier will look for specialists and companies that have already reached a certain volume of business. Only in special cases will it be interested in small companies (i.e., if they have many skills that have the potential for developing something). But the requirement is that the VAR be profitable, have investments supporting the company, and have skilled people. If a candidate VAR can balance engineering, services, software services, and software sales with its implementation, and training services, it becomes an efficiently working machine.

A VAR can be a regional VAR with a limited geographic target market. A market focused VAR can sell products to customers in a specific industry. In this case, the target market is not geographically limited to the same degree as a
regional market, but it might still be limited to only Europe or North America. A PLM system supplier builds strategy together with its VAR to serve a specific part of the market. The supplier avoids having ten VARs doing exactly the same thing. Instead, it tries to ensure they are specialized in a way that they complement each other, rather than compete for the same business.

### 7.3.1 Value Creation Strategy

Some VARs have a good and quite advanced strategy for creating value and for implementing it. Whereas others work more in an opportunistic way, seeking all sorts of businesses and finding whatever they can. A PLM system supplier tries to listen to its VARs and to understand how they want the supplier to develop its business in the future. It tries to define its value creation accordingly. If VARs do not know where they want to grow or how they want to address the market, then it becomes difficult for the supplier to do the right things.

In the PLM systems context, the basic VAR value creation strategy is to help customers be successful in their business by developing their operations and processes and by improving their productivity using a PLM system supplier’s product offering together with a VAR’s own product and service offering.

"Our task is to step into the customer’s shoes and figure out what they should do to be able to be more profitable and more efficiently improve their productivity." (VAR 2, 2011)

A VAR’s value creation strategy is dependent on whether a VAR wants to be a software reseller, service organization, product organization, or any mixture of the preceding types.

"If you’re a profitable reseller with a good consulting business, then it’s not that easy to transform yourself into a product company. And maybe a good consulting company, a good reseller, and then a good product company, that’s three different, maybe, should I say, creatures. So I think that’s extremely hard to master all these disciplines.” (VAR 3, 2011)

A VAR’s strategy may be to deliver solutions for a wide range of industries or to large as well as small customers. A VAR’s strategy may also be to focus more on specific industries and to develop a deep understanding and knowledge about these industries. The PLM maturity of the target industry has an impact on a VAR’s value creation strategy. A totally new customer requires a different type of
strategy than an existing customer. If a VAR is involved in an immature PLM systems market, its business strategy could be to mature the market through marketing, co-operating with universities, research institutes, and public financial institutes, and teaching the markets.

“The new market, the new customers, they may be in the first cycle. They are not mature when it comes to buying PLM, buying services and running PLM. So, I think you can have more of a bundle, full service supplier approach to the new market than to the existing one, because on the existing mature one, you have the competition from the low cost companies selling services. So I think it doesn’t really matter industry, it’s rather the maturity discussion, how mature is the specific industry.” (VAR 4, 2011)

Strategic partnership with a customer means that the cooperation between a VAR and its customer is so close and tight that together they develop a customer’s business using the VAR’s products and services.

“At the best it means that it is very long-span cooperation. Of course it is done phase by phase but when one project is finished, there is a new application area, which development starts.” (VAR 1, 2008)

A strategic partnership or higher position in a customer’s value chain requires that a VAR fully understand the customer’s business, its requirements, and its limitations, such as regulations.

“… in my opinion it means that we have to understand the customer business and only through the business understanding we can create the kind of value add to the customer, that we want in a value chain, where we want to be.” (VAR 5, 2011)

A VAR’s value creation strategy should not be a static model. It must have at least some dynamic elements. Dynamic elements in a VAR’s strategy are ideas of how a VAR can create value for its customers when the customer’s business model suddenly changes or when similar changes occur in the VAR’s business environment. A dynamic element in the VAR’s strategy could be, for example, how the VAR will support its customer if the customer expands to international markets or moves a part of its functions to another country, quite often to a country where operating costs will be lower.
If a VAR’s service delivery strategy is fixed price delivery projects, then the scope of the customer’s delivery is most likely something a VAR has delivered previously to another customer. Customers prefer fixed priced projects to hourly-based projects.

“We try to find easily sellable fixed price projects, which are profitable.” (VAR 2, 2008)

“… nowadays we do fix price projects, which we think is our competitive advantage.” (VAR 1, 2008)

If a VAR develops a product or piece of product that its PLM system supplier integrates as part of its platform, the VAR will first need a robust R&D strategy, but will also need a revenue generation strategy, which defines how the VAR intends to generate revenue from the integrated part of the product. It also needs a marketing strategy that takes into account the integrated part of its product offering. It must consider whether it is part of the VAR’s product offering or part of the VAR’s product offering available only through the supplier.

Existing customers do not recognize a VAR’s value creation strategy, only the value proposition slogan is known. The value creation strategy is more visible to a new customer during the sales phase than during any other phase of the business relationship. It seems that the VAR’s value creation strategy is not visible to its suppliers either.

**7.3.2 Business Model**

Changes to the software products business model also reflect the PLM systems business, as they are software products. The license selling business model creates a license base that guarantees a steady income to the supplier through maintenance fees. The older the company is, the larger the existing license base is, as well as the subsequent maintenance fee flow. New business models like SaaS and project-specific tools type of business models are emerging into the PLM systems markets as well. The question must be asked, what will the VAR’s role be in these new business models? The SaaS type of business model is already common among CRM systems and VARs still exist in that context. Perhaps the VAR’s business model will change, but there is always demand for services. The online software business model is seen as a new business opportunity for VARs.
“I believe that it is exactly the same also here, it does not disappear; maybe it change the VAR business, the service business changes and may come even more important to the VAR. ... Let’s say that the proportion changes. It may happen that in VAR’s business the part coming from licenses may become smaller and the importance of services may grow” (Supplier 6, 2011)

The future business model might be in the form of communities in the network that include products from PLM system suppliers and services from VARs. Online communities remove the need for a physical sales forces as well as the need for a physical presence. There have been attempts and experiments to do this, but it is still at an early stage.

“We have some major companies that is renting their software ... we see that it’s coming more and more.” (VAR 3, 2011)

“... but actually I read a blog post the other day that PLM System Supplier X doesn’t feel that the customers are mature enough yet. That is pushing IT as a service.” (VAR 4, 2011)

The VAR’s business model is not visible to VAR suppliers. In the following sections, a discussion is presented on the findings of the within-unit analysis of the building blocks of the VAR’s business model elements in the PLM systems context. The headers of the sections are from the preliminary research framework (see Section 5.3.2 and Table 18).

Value Proposition

A VAR creates value for its customers through its product and service offering. VARs are representatives of their PLM system suppliers’ products. They use suppliers’ products as the basis for their own product and service offering. A knowledgeable VAR creates value for its customer through productized services. Productized services simplify the supplier’s offering and translate it into functional portions that are meaningful to a customer, enable a quick return on investment, and enable fast deliveries of exactly what the VAR has promised the customer.

“... with smarter implementation offering, that we could do things in shorter time, less cost, higher value, to really put something into use within months versus years.” (VAR 3, 2011)
Product and Services Strategy

A VAR’s product and service strategy is customer-oriented. New requirements come from the customer either during the sales phase or during the delivery project. A VAR might use a more formal method, like a customer advisory board, to collect customer requirements. The most common way is to implement the functionality during the customer delivery project and share the costs with the customer. Some VARs have a dedicated R&D organization unit for conducting product development.

Target Customers

A VAR’s strategy defines the scope of its target customers. A VARs’ customer base is wide when viewing it from an industrial sector point of view. A VAR’s customers come from manufacturing industries (e.g., automotive, aerospace, electronics, telecommunication, and machinery). But customers also come from other industries such as pharmaceutical, textile, consumer packaged goods, and construction industries, to mention a few. Customers from the public sector are not common, but there are VARs with a product and service offering that fits certain public sectors like healthcare.

When viewing a VARs’ customer base from the company size point of view, the variation is wide, from multinational companies to small SME companies. The PLM platform functionality and pricing model limits the VARs possibilities of achieving new customers from the SME company sector.

Customers are divided into mature and immature customers based on their PLM cycles. Mature customers know how to buy PLM systems and what can be expected from them. New customers are at a more novice level in their PLM activities.

“We sometimes refer to the number of PLM cycles\(^4\) the companies have been going through. For example, if you take a customer such as Customer W, they are into the third or fourth PLM cycle they’re going through. Same thing for Customer S, they’re going through the third PLM cycle. So they’ve been through these cycles several times, which means that they have matured on how to buy software, how to buy services with respect to PLM and how to run

\(^4\) The informant refers to the number of PLM system implementations or major system upgrades a customer has gone through.
PLM. The new market, the new customers, they may be in the first cycle. They are not mature when it comes to buying PLM, buying services and running PLM.” (VAR 4, 2011)

Another way to categorize a VAR’s customers is by customer activity level. There are customers with an activity level close to zero. They may be considering what to do next or may be customers who for one reason or another have given up. Then there are customers with an activity level that varies. They buy new products or services every now and then. Then there are customers with a high activity level. Typical examples of high activity customers are customers who have just purchased a product, products, or services. Customers may have a high activity level because they require a lot of support and maintenance service.

Marketing Model

A VAR’s marketing model relies on campaigns, road shows, fairs, direct marketing, web-marketing, telemarketing, industry seminars, and marketing in cooperation with the PLM system supplier. There are mixed views about social media. One informant sees it as a possibility; another informant takes the view that it is not a feasible marketing channel in the PLM systems context. A VAR’s marketing is visible to existing customers.

“... investing some in the Web, we are not doing enough on social media, we’re trying to establish ourselves there.” (VAR 3, 2011)

“When we had our own marketing event, we put it there as a trial but we our opinion is a bit that, because we are not in a consumer business, Facebook is not the right channel for us.” (VAR 2, 2011)

Sales Model

The first task is to find someone who is interested in buying a PLM system, or who becomes interested in putting this kind of initiative into his or her personal agenda, or even on the budget. The sales cycle is rather long, from one to two years. Smaller customers are quicker in their decision-making than larger ones. An informant believes that if a VAR is good at convincing the customer how to achieve a quick Return On Investment (ROI) with the proposed solution, it might shorten the sales cycle. The informant states that the ROI is an important aspect in
decision-making because selling in the PLM systems context is more about selling soft values than selling hard-core values. A customer’s PLM maturity has an impact on the VAR’s sales model. Public sector customers require their own type of sales model, which is regulated by law.

“I would say from the first meeting to when you have, I would say two years typically. I think, maybe the, clearly smaller customers, I would say, they probably invest a bit quick, they don’t have money to do this two-year evaluation, and look at 20 suppliers.” (VAR 3, 2011)

Service Model

A VAR’s maintenance and support model relies on the PLM system supplier’s maintenance model. In some cases, a VAR has a maintenance and support organization of its own. With bigger and more mature PLM customers (i.e., enterprise customers) the maintenance model is a Service Level Agreement (SLA) type of arrangement. A service model is visible to the customer, but an existing customer will prefer that it be more productized in nature.

Relationship

Three descriptive characteristics of a VAR-customer business relationship are cooperation, trust between the parties, and long-term relationships in the lifecycle. A successful VAR-customer business relationship is the best sales argument.

“Every successful customer relationship is the best sales argument, what we have. It means that we use customer references. Software is not that important in this market5. Customer references and knowledge about customer business are the topics, which are important when selling. And that is why this business is sometimes so hard.” (VAR 1, 2011)

Success in the VAR-customer business relationship is related more to profitability of a customer than to the size of a customer.

“The relationship might be, they, in practice they have the same needs, but they have a different spending power. So I think it’s much harder to make small, mid-sized company successful and happy with relationship. ... Or

---

5 Informant refers to the PLM systems markets.
maybe it doesn’t only relate to the size, it could also relate to the type of profitability the company has. You could have a small, relatively small company that invests a lot in PLM, because they have the potential based upon their profits. So that could still be a good customer to us, and ... But generally speaking, the ability to address and serve smaller customers, it’s pretty complex. Because you need to have this very strong ability to deliver something quite standardized, and to also maybe be really the adviser, and to make them use standard functionality instead of tailoring it.” (VAR 3, 2011)

**Information Strategy**

Direct contact with potential customers is seen as the most efficient way to collect information about customers and markets. Some VARs collect information through customer service and satisfaction surveys.

> “During the past years we have done different type of seminars, enquiries and analyses and so on. In the end the most efficient way, according to our experience, is simply personal contacts.” (VAR 1, 2011)

For an existing customer that has a relationship governance model in use, information sharing and collection is part of the model. With a new, smaller customer, the information sharing and collection model is based more on personal-level relationships than a systematic approach.

**Delivery Model**

The most common service delivery model is delivery of projects either on an hour-by-hour price project basis, or a fixed price project basis. The traditional software product delivery model is either by CD delivery, downloadable service, or both of them. The latest trends in the software product delivery model are SaaS and license leasing, which some VARs include as part of their offering.

**Partner Network**

A VAR’s partnering network is the supply network, which is an ecosystem of its own. It consists of different types of suppliers and in some cases, even competing companies. The main supplier is the PLM system supplier.
“... there might be these type of big system integrators like Integrator A, etc. But on the other hand they are our rivals. Then we have smaller companies like Supplier A and Supplier I even one man’s companies ...” (VAR 5, 2011)

The PLM system supplier has a yearly business plan development process based on initiatives of a supplier and a VAR. The supplier and VAR together build a plan on how they want to develop the business together. This business development plan sets the framework for the VAR supplier business relationship. The VAR-PLM system supplier relationship is guided by the strategy the supplier defines, but is a two-way relationship where the supplier listens to its VARs and tries to understand how the VARs want the supplier to develop the business in future years. Changes in the supplier’s strategy have an immediate effect on the VAR-PLM system supplier relationship.

“... to get a big company as a customer may take several years and then suddenly it is taken away from you, it is not cooperation any more. There should be perseverance and also respect for already existing customer relationship and from agreement point of view also ...” (VAR 2, 2011)

In a VAR-PLM system, the supplier relationship agreement between the parties establishes the framework for the targets and limitations of the relationship, as well as how the relationship will work on an operational level.

“We would put forward a more formal governance model together with Supplier I. ... now the new contract says we have monthly forum, quarterly forum, and then we have weekly meetings.” (VAR 3, 2011)

Supplier selection in the PLM systems context is based on how well the companies are suited to each other, how well the companies’ vision for roles in the market place is aligned, and how well the companies’ business cultures are aligned. Suppliers may try to extend their business possibilities by having a business relationship with several VARs, although the individual VARs are competing against each other. Alternatively, the supplier may offer services to a VAR at the same time that it offers the same services to a VAR’s customers. An informant concluded that they try to be friends with all parties.

6 Informant refers to a global system integrator.
7 Informant refers to a medium sized service provider.
8 Informant refers to a small consulting company.
9 Informant refers to its PLM vendor.
Financial Aspects

A PLM system supplier’s product is very rich in its features. The pricing model of the products has a strong impact on the VAR’s ability to sell it to customers, especially to SME customers. A customer expects the price of the VAR’s service offering to be competitive when comparing it to mere service companies.

“VAR should have several different level products for after sales to existing customers. ... existing customers have to pay too much about the after sales it is overpriced and the platform is too expensive. In case of platform version upgrade the customers sure enough are considering competing solutions, because they do not feel that they will benefit from upgrading the existing platform.” (VAR 2, 2011)

A VAR’s revenue in the PLM systems context comes from software license sales, including revenue from license sales of its own products, if they exist. In addition, revenue comes from service sales and software maintenance. The proportion of each of these components to total revenue varies from VAR to VAR, as well as year to year. The most powerful influence in revenue generation is the VAR’s value creation strategy. The main expense is personnel costs.

7.3.3 Value Creation Functions

In general, a VAR’s value creation functions are not visible to a VAR’s suppliers except to the PLM system supplier. The following sections discuss the findings of the within-unit analysis of the VAR’s value creation functions in the PLM systems context. The headers of the sections are from the preliminary research framework (see Section 5.3.3 and Table 17).

Marketing and Sales

The marketing and sales value creation function has high importance in the PLM systems context, as building of the VAR-customer business relationship begins during the sales phase. The basic building blocks for developing the future relationship are established during the sales phase. A VAR’s marketing function is a cooperative function with the PLM system supplier. It is important to the
supplier that its VARs’ marketing activities go hand-in-hand with its own activities.

Marketing through emails is not necessarily that effective because it does not differentiate a VAR from any other supplier. Customers tend to have a mailbox full of unread emails and the same type of marketing emails may come from many other suppliers.

Customer events give customers the opportunity to meet the VAR’s personnel. Daily cooperation is normally accomplished through contact between the customer, the responsible sales person and the project team. A VAR’s customer events should be of high quality offering something useful to customers; otherwise the event may backfire against the VAR.

Customers want to be able to freely discuss their daily hot topics. They want to have regular, more informal customer meetings that do not require an official agenda, or if it exists, it should be very light one.

Although the VAR may organize customer and marketing events that customers find beneficial, there is a trend indicating that customers also want to cooperate between themselves without the presence of a VAR or any other supplier. They want to share their experiences about their PLM initiatives and what suppliers were used, etc.

Small VAR companies cannot afford to dedicate people to specific jobs. Rather, they highlight multi-talented employees that have been able to master several roles in the company. Larger VARs have a more structured sales organization and clear roles and responsibilities. The sales function requires experienced and knowledgeable resources. Mere selling experience is not enough in the PLM systems context. Customers expect to see high level expertise in the sales phase. Advanced know-how and knowledge are ways to differentiate a VAR from its competitors during the sales phase. The modern sales function requires that a supporting IT tool be efficient, straightforward, and present a professional image to customers about the functions and about the VAR company.

There is always a sales person involved, but the participation of other sales team members will vary on a case-by-case basis. The target of the sales team is to understand the customer needs as quickly and completely as possible. The other goal is to demonstrate the added value the proposed offering creates for the customer and how it is created. If a customer has a clear problem, there is a need to show how the problem can be solved using the PLM system.
“Support team, training team. Maybe I would say admin and sales or ... the sales obviously are important in understanding the value we could create and to promise, understand really the needs of the customer and to map that to our products and services portfolio ...” (VAR 3, 2011)

The sales phase may include a system demonstration or even several demonstrations, which help to make the customer aware of the real value of the proposed solution. Different types of business evaluations and concept proposals may also belong to the sales phase. If a VAR’s value creation strategy leans on a standard offering, then the sales team is responsible for convincing the customer about its superiority over a customized solution.

“So even though you will suggest a standard product, a standard offering, you have (then) to be able to describe to the customer why this standard process is better than the current process. So that ability to have these, very knowledgeable persons that could do that work, to help the customer to understand how he could get the same or more value out of a standard solution, versus a customized one that will be much more costly.” (VAR 2, 2011)

In the PLM systems context, the reality is that service companies from low cost countries like India are competing against local VARs. It creates new requirements for a VAR’s sales function. The customer expects to see a solution-oriented sales function that sells what the customer really needs, more than what the customer asks for at the beginning.

Service products are rather abstract things. The sales function should model the service product and using this model makes the offering more concrete to a customer so that it fully understands exactly what product is being purchased. In general, what the sales function creates and delivers to the customer should be realistic, although the market situation and competition in the PLM systems context is tough.

Reference visits are an integral part of marketing and the sales function in the PLM systems context. A new or existing customer that plans to expand its PLM functionality may visit an existing customer that has a similar type of solution that is already in use. Customers may not necessarily be from the same industrial sector. A reference customer can be the VAR’s own customer or its PLM system supplier’s customer. The reference visit can be replaced with a reference call in
which the reference customer shares information during a conference call. All informants mentioned the sales function.

**Product and Service Development**

A VAR has a rather small R&D function if it has its own product or products in addition to the PLM system supplier’s product. Product development requirements originate from customers and, for certain PLM features, from regulations. If a VAR develops its own product that has regulated features, a VAR must keep the product upgraded according to regulations. The other result is that a VAR must ensure customers understand the effects that changing regulations may have on its business. Preconfigured, productized solutions are developed using customer-specific requirements as input. A VAR may try to generalize these requirements so that they fit as many customers as possible.

“But we do this as customer-oriented. Requirements are coming from customers. We generalize them at certain way into our product. A customer requirement can be very application specific; that’s the way it has to work. We evaluate its generic use and implement it into the product that way.” (VAR 1, 2011)

If a VAR develops something that is added to a PLM system supplier’s platform, the supplier tries to avoid the situation where both the supplier and VAR simultaneously develop the same kind of product or product feature. If a VAR has a product of its own, it should also have a product management function in place that actually owns the product and its roadmap.

“Someone is providing the product, which is the product development organization, they are providing the products. The business areas are the revenue creators, selling it to the customer. There’s three parts in this chain, which means that the product organization should be seen as suppliers to the revenue creating, should be seen, in my view at least, should be seen as suppliers to the business area, which then are suppliers to the customers.” (VAR 4, 2011)

A VAR’s R&D function is visible to the PLM system supplier if the VAR develops something that is added to a supplier’s platform. If the VAR develops something of its own, then the VAR’s R&D function is not visible to any supplier.
**Product and Service Delivery**

As part of a VAR’s delivery function, the delivery project model or process is defined and a VAR follows the defined process when planning and executing its delivery projects. The line-up of the delivery project is decided on a case-by-case basis, but there is always a project manager responsible for the project and its deliverables.

There is always room for improvements in the VAR’s delivery function. This seems to be a very customer-specific issue. When the delivery function delivers service products, there are always high resource requirements involved. When selecting project resources, the organizational position of the focal customer must be taken into account. If the end customer is a person or a group from management, then the VAR’s resource must be capable of communicating using management-level terms and the content should be management-level content. If the focal customer is a technical person, then technical expertise is required from the VAR’s resource. Large customers expect that they have the privilege to ask a VAR to reserve a certain person(s) for their projects, even if there is no, or only a very faint possibility of, actual usage of the resource.

If delivery forms part of the service project, the customers expect realistic resource and schedule estimations that are communicated early enough to the customer. Resource availability must be secured before the service project plan is presented to the customer. A customer will not be happy waiting eight weeks for delivery of a service that actually requires only four days of work.

Support functions require continuity. Holiday and other leaves of absence should not impact the service level to the customer. A customer expects that substitute personnel and other special arrangements be communicated clearly and sufficiently early. They require that product upgrade terms and time frame be communicated clearly. They need information regarding termination of platform or product release maintenance in good time to be able to plan and execute the upgrade project.

**Human Resource Management**

The human resource management function is a challenging aspect because customers set high requirements for seniority and knowledge of a VAR’s personnel. In the case of a multi-site organization, personnel seniority and
knowledge level should be equal between sites. In addition to seniority, a customer expects to find multitalented experts with excellent social skills who understand customer business processes. In addition to these overt expectations, personnel must be smart enough to identify what the customer really needs, which may not necessarily be what the customer asks for.

When the VAR is a relatively small company compared to its larger customers, there is always the risk that the customer’s business understanding will be more employee specific than a company-level feature. If a VAR has a multi-site organization, it is hard to hide the site-specific resource availability and the knowledge differences from customers. Customers expect to see a single VAR, not a site-specific VAR. They expect that there be no difference in service level, no matter which VAR’s site is the expert’s home site. The same applies to resource availability. Customers are not interested as to which of the VAR’s sites the experts come from so long as they get the resource whenever needed and at the appropriate expertise level.

Firm Infrastructure

Administrative functions like ordering and invoicing are visible to the customer as well as to the supplier of a business. A customer values the VAR’s quality functions only if it has something useful to offer that will improve the quality of the customer’s PLM initiative. Other administrative functions exist, but none of the informants gave any detailed information about their size or responsibilities.

Knowledge

Strategic information sharing about the PLM system supplier’s product is important. From the VAR’s point of view, the quality as well as good documentation, especially the interfaces and development environments, are the most important features of the PLM system supplier’s product.

VAR internal knowledge transfer related to what has been delivered to the customer and how it has been implemented technically should be an efficient and formal process. The customer does not expect to see any quality issues or disturbances even if there is a change in the VAR’s resources of the service delivery project. Knowledge transfer and information sharing between the VAR’s sites should be invisible to customers.
If a VAR is interested in giving end user training, the prerequisite for it is that the VAR’s trainer understands and uses industry- and customer-specific terminology and that he or she speaks the same language as the trainees.

7.3.4 VAR-Supplier Business Relationship

The business relationship between the VAR and its PLM system supplier is a love-hate relationship with a lifecycle. In general, it is not a relationship between equals.

“It's not a relationship between equals. One is 8 000 people and the other one is 160 or 170, ...” (VAR 3, 2011)

The cornerstones of a VAR-PLM system supplier relationship are common trust, that the parties know each other, and that the parties share a common interest.

“VARs are independent companies, which do business with us because it is beneficial to them and vice versa. ... It is based on common interest.” (Supplier 5, 2011)

In the relationship, the overall culture and specifically, the business culture, of the supplier has an effect on the business relationship. Customers recognize conflicts in the business relationship between the VAR and its PLM systems supplier when a VAR cannot service the customer as expected or when a VAR cannot deliver the information the customer needs.

“... it creates clearly conflicts between management cultures, when ... hierarchical management culture meets this Scandinavian open management culture ...” (VAR 5, 2011)

The VAR-PLM system supplier relationship is a sales relationship where a VAR concentrates on selling and marketing a supplier’s products. If the VAR represents products from other suppliers, the PLM system supplier expects them to be sold through other channels. A VAR and its PLM system supplier may cooperate in product development to make sure that the VAR’s own product fully completes and is in line with the supplier’s product portfolio. A VAR-PLM system supplier relationship may also be a service relationship where the VAR acts as a second tier support in a PLM system supplier’s customer support model. In this
role, a VAR filters certain parts of support requests and only the most severe ones go to the supplier’s support organization. A VAR can also act as a service provider to its PLM systems supplier.

A partner agreement between the parties will define the cooperation at an operational level. The cooperation between the VAR and its PLM system supplier requires the VAR’s time and resources. A VAR’s business relationship to other suppliers is based on trust and synergy between the companies, which creates the possibility for building a win-win-win relationship between the supplier, VAR, and customer.

“I think, as I said, very important is the trust in each other, and a clear statement that there’s no competing situation, there is a win-win situation, that is important base for further relationship with VAR, I think in both directions.” (Supplier 3, 2011)

A VAR-supplier relationship is a complementary relationship, where the supplier’s offering, skills, and knowledge complete the corresponding features of the VAR. In some cases, the relationship may overlap in the areas of offering, skills, or knowledge. A vital VAR-supplier relationship is aligned at all levels (e.g., the roles in the market, cultures, people, skills, etc.). In a new VAR-supplier relationship, cooperation at a personal level is more obvious than functional cooperation.

“I think we are very well-suited to each other, I think that our vision for roles in the market place is aligned, I think our cultures are aligned, I think the quality of the people that we have in each company is very synergistic.” (Supplier 4, 2011)

If there is competition within a VAR-supplier relationship, then a supplier may provide services to a VAR with respect to a certain customer project, but it can be a competitor in another customer project. This type of supplier may be a company whose offering is to provide project resources to a VAR, but it can always offer the same resources directly to the VAR’s customer.

A cooperative relationship requires at a minimum that in a customer project, a VAR and its supplier work in cooperation with each other and are managed in a way that creates value for the focal customer. The result of the cooperation is an innovative service offering, which in addition to value creation may be a differentiating factor in the market. The most vital feature of the relationship is that the supplier does not have the competence to compete in the market without
the VAR. A VAR and its supplier may have a common customer, but their offerings do not overlap.

**VAR-Supplier Business Relationship Value**

The prerequisite for a VAR-PLM system supplier business relationship is the existence of a growing business on both sides. Otherwise, no investments in the relationship will be made. Requirements for mutual value creation in a VAR-PLM system supplier business relationship are trust and that each party know each other. When the business relationship becomes deeper and the know-how is broader, further growth of business is enabled and increases the possibilities to create new business. In general, a business relationship with a large global company like a PLM system supplier creates credibility for the company’s business and in that way creates value.

A working business relationship between a VAR and its supplier enables value creation through common customer references, through a shared common customer base, and through use of common knowledge and experience. A relationship with a company that has a strong company brand and possibly also a strong product brand creates value.

A supplier’s value creation relies strongly on various types of cooperation with a VAR and also on the supplier’s ability to deliver what it has been promised, even if the delivery size is large compared to the size of the supplier. A relationship with a supplier creates value if it improves the ability to respond to customer requirements and its R&D capability. Value creation in a VAR-supplier business relationship can be short-term or long-term depending on the strategic position of the supplier in the VAR’s supplier portfolio.

“I would say it varies based upon the strategic nature of the supplier; I would say. If you have a need for a certain set of functionality and you find a supplier for that piece of functionality, and then it might not be so strategic, it's just, for that specific case then obviously value creation is quite immediate and it might not be that long-term. But then the, if you look at other relationships, we try to do business development together and it's maybe an ongoing process to make more out of it.” (VAR 3, 2011)
The preceding within-unit analysis of the empirical data is aggregated in the list below, which notes the sources of value in the VAR-supplier business relationship of the PLM systems context:

- Profitable business,
- New business opportunities,
- Credibility,
- Customer references,
- Common customer base,
- Knowledge,
- Product brand,
- Company brand,
- Predictability in engagements,
- Improved customer requirement fulfilment, and
- R&D capability improvement.

7.4 Customers

Customers are divided into mature and immature customers based on their PLM cycles. A PLM cycle is a process that begins in the sales phase and continues through the system selection until the use phase. When it is time to either upgrade or replace an existing PLM system, it is the beginning of a new PLM cycle. Mature customers know how to buy PLM systems and what can be expected from them. They use direct, low-cost service suppliers. New customers are at a novice level in their PLM related activities.

“So, I think you can have more of a bundle, full service supplier approach to the new market than to the existing one, because on the existing mature one, you have the competition from the low-cost companies selling services. So I think it doesn’t really matter industry, it’s rather the maturity discussion, how mature is the specific industry.” (VAR 4, 2011)

The PLM systems market has both mature and immature industries as customers. A mature industry refers to how common PLM systems are among companies within the focal industrial sector. Inside a mature PLM industry, there are large enterprises that are mature as well as SMEs that have not even started their PLM journey. PLM maturity is largely dependent on the size of a company.
“The enterprise customers are mature, but the small and medium might be immature ... in mature industries, enterprise is mature but small might be immature. But in new industries everyone is immature.” (VAR 4, 2011)

Industry-specific pioneering companies set an example for other companies within an immature industrial sector. They always have followers, whose threshold for beginning a PLM initiative is lower than that of a pioneering company. The followers benefit or try to benefit from the experience of the pioneering company.

7.4.1 Customer Business Goals

The estimated cost of a PLM system implementation is at the same level as the cost of an ERP implementation. Customers in the PLM systems context have experience with ERP system implementation, which may make them wonder whether the PLM system investment is worthwhile. Are the achieved benefits at the level that payback is realistically achievable? Before making any decisions regarding PLM system selection and implementation, a customer can run business surveys or analysis to find the real bottlenecks in the organization and in its processes, determine whether those bottlenecks are removable using a PLM system, and finally, the realistic achievable benefits of PLM system implementation.

Customers set business goals for their PLM initiative, but it seems that they do not set metrics that measure whether or not the goals are achieved. The success measurement seems to be based more on budget against rather than follow up and on personal gut feelings. If facing problems, a customer may create ad hoc metrics, especially to measure new system performance and compare it against legacy system performance.

“We do not have that kind of experience yet that we could see the real benefits. Except that now when it\(^{10}\) is in one place, we operate more systematic way. The benefit is that information is visible. Phone calls, emails, and all that kind of things have been diminished because all data is in one place in one format.” (Customer 1 and Customer 2, 2011)

\(^{10}\) Informant refers to product development information.
The following sections discuss the findings of the within-unit analysis of customer business goals in the PLM systems context. The headers of the sections are from the preliminary research framework (see Section 5.4.1 and Table 3).

**Operational Benefits**

A customer’s business goal is to cost effectively manage complexity and improve productivity by managing its product development process and simultaneously manage product related data and the product lifecycle. It reduces unnecessary and duplicated work.

“We thought that our product development process in under control but as a matter of fact a process without any IT support is not controlled. Taking that process into possession was one major factor.” (Customer 1 and Customer 2, 2011)

The company’s goal is to achieve one truth in its product information, which means that through generic working methods, different levels of product information are correct and available at any time to the end users with access rights to see or use it. The role of correct product information is vital in post-marketing and service functions. An integral part of product information is product related documents. A customer is looking for a solution to support its document and data review and approval process, and through that, to improve the data traceability and reasons for related actions.

“A customer of course thinks that when the product is ready and we deliver it to the customer, then I can say to a customer that if after three years you come and ask something related to product, then the only thing I do is one click and I can show it to you straight away.” (Customer 7, 2011)

Customers in the PLM systems context look for a system that helps them manage the constantly changing legislation requirements. They look for a solution that will send notifications or alerts when a certain legislation related deadline is about to occur.

Supplier originated information management along with bidirectional collaboration capability is also a business goal. Customers save time and money when they partly devolve the data maintenance to suppliers. Suppliers are also responsible for the information validity. Bidirectional collaboration is also a business goal when a company wants to send information to its suppliers.
Internal and external integration between the enterprise systems (e.g., internal integration between the PLM system and the ERP system or external integration between SINFOS and PLM system) reduce duplicated work, secure the data quality between the systems, and reduce cycle time through automated data transfer between the systems, all of which are customer business goals.

**Managerial Benefits**

Process metrics of not only the product development process, but also other processes, are a part of process management. They are characteristics of process throughput as well as input for process improvements.

“It is typical in this type process life that there are always process metrics, which come in. And then the metrics are one of the most difficult topics to implement.” (Customer 3, 2011)

**Strategic Benefits**

A customer’s business goal is simply to achieve a competitive edge over its rivals and keep it for as long as possible. The first company to implement the PLM system in an industrial sector gains a competitive advantage. It can keep the advantage by introducing new features, new ways of working, and extending usage of the system to new organization units. Of course, a customer wants to create value for its own customers. If a customer business goal is to merge an acquired company tightly into the mother company, then a PLM system is one enabler that can be used to achieve the goal and the associated business and strategic benefits.

“We can create value to our customers using this and these things. We can tell and show them how we really operate and what are our deliverables.” (Customer 7, 2011)

Sometimes a customer’s original target is to find a point solution for a single business problem, but the customer ends up selecting a PLM system instead. It prefers to have a feature rich system with user friendliness to maximize company level strategic benefits. The customer wants to use new features from the platform as soon as possible.
“Initially we were looking for document management system, which during the 2000s had developed so that most of the systems had wider functionality and this product data maintenance was kind of add-on to systems’ functionality.” (Customer 3, 2011)

**IT Infrastructure Benefits**

A simplified IT architecture might be both a business goal and the consequence of a successful PLM system implementation. If the legacy system is actually a directory and file system on a server and the customer’s target is to gather all information into one place and manage it in a generic and formal way, then a simplified IT architecture is more of a consequence than a clear target.

PLM system customizations are commonly avoided. It might even be a company policy-level decision. If there is a misfit between the system and business requirements, it is solved by either using the system’s configuration capabilities or using process and workflow workarounds.

**Organizational Benefits**

The role of correct product information is vital when a company wants to prevent information leaks in the case when an employee resigns, retires, or gets sick. If there is no systematic way to store information, critical business information that is employee specific becomes silent information that is hard to transfer into a form that it is usable by other employees.

**7.4.2 VAR Offering**

The most important part of a VAR’s product offering comes from its PLM system supplier. The PLM platform product is seen as a collection of tools that can be integrated as one customer-specific system. The product offers continuity to a VAR’s customers. In some cases, the platform might be at a very generic level, which is a disadvantage because the functionality is too generic to fulfill a customer’s specific requirements that are critical from the customer’s business point of view. A VAR’s own products are considered to be value added products that either complete or improve the PLM system supplier’s product. These are ways to take care of a VAR’s competitiveness and to differentiate itself from its competitors. A VAR’s product can be used to make local implementation of the
PLM system supplier’s product easier, as the supplier’s product is very generic. A VAR’s product could be a stand-alone product. The platform product and the VAR’s product are configurable. The VAR’s product can to some extent even be customizable.

“Let’s say so, that from the business growth point and from this kind of reuse point of view, and even from the international business point of view this type configurable product is an absolutely must.” (VAR 2, 2008)

Customers who are looking for a solution that is specifically developed for their industry can value a generic type of platform that is too generic or too removed from their business. They may find the configuration work required by a generic platform too time consuming, too laborious, too expensive, or all three. The customer may feel that the platform features are overkill compared to its actual needs. It may conclude that the implementation is too challenging.

“Product-E11 was not from the lightest end of software. We felt that its adoption and implementation it challenging. It scared us that we really need to put enormously resource to make sure that it becomes a product to use.” (Customer 3, 2011)

A VARs’ service offering consists of consulting service, much like business consulting. VARs offer system and supplier independent business process and concept development as a service. Customer-specific delivery of a project often includes system rollout topics related to consulting services. Generic or customer-specific training is also part of the service offering. SaaS services belong to the offering.

“Of course we have training and naturally one, I have started to think that okay project deliveries is one. Then is consulting I mean pure consulting. Then of course there are support services. That’s one.” (VAR 2, 2008)

Financial services may exist (e.g., extended payment terms or payment-based milestones), but are not that common. Maintenance services belong to a VAR’s standard service offering. Sometimes a VAR can offer its customer free product prototypes that do not have proper support or maintenance. Doing so can be like a double-edged sword for a VAR. If a prototype functions, it works as evidence of

11 Informant refers to a PLM system platform.
the VAR’s ability to create new, innovative solutions. If a prototype has
malfunctions, it may ruin the reputation of the VAR.

Customer business evaluation and analysis types of service packages are part
of a VAR’s service offering. The customer can use the results when considering
whether to start a PLM system implementation or not. These types of services act
as a competitive advantage for the VAR during the selection phase because
hopefully the customer will form a positive impression about the VAR and its
capabilities.

A customer expects that the VAR has expertise in organizational change
management and should be part of the VAR’s service offering. Customers, even
big ones, seldom have knowledge about organizational change management
because their daily business is to do something else.

7.4.3 VAR-Customer Value

This section has been subdivided according to the analysis coding (see Table 30).
The coding is from the preliminary research framework (see Fig. 9) and was
further developed during the analysis phase to enable a deeper empirical data
analysis.

VAR-Created Value

A VAR can create value at all stages of a VAR-customer business relationship
lifecycle, especially through its service product offering. A VAR creates value for
its customers by being close to its customers culturally and physically, and by
understanding its customer’s businesses. A VAR’s own products that either
complete or improve the PLM system supplier’s platform functionality are one
way to create value for customers. A VAR’s own product is not necessarily the
only software product; it could be a packaged service product as well. SME
companies especially appreciate that they receive such services as consultancy,
implementation, training, and support directly from the VAR. The customer may
feel they are too small to receive the same level of services from a PLM system
supplier directly.

The better a VAR knows its own offering and capabilities, the more it creates
value for its customers. Through mastery of its own offering, a VAR can
introduce ideas and concepts of how a customer should implement and use the
PLM system and the whole offering. A VAR can use product demonstrations to
familiarize the customer with ideas and concepts. Customers value a VAR’s ability to localize its services. Training us completed using local language and the training examples will come from the customer’s daily business.

“VAR X has acted as an intermediary. It has presented offering and its possibilities. It has been in an unrewarding position in the sense that we have not really known what we want. In this situation VAR X has been able to facilitate the discussion, to present features, and to give use case examples from other industries. It has been able to transform these use cases into use cases of our industry.” (Customer 6, 2011)

A customer has limited resources and possibilities for gathering information about industry-specific special practices. The ability of a VAR to share the information is highly valued. A customer values the VAR’s know-how and experience to:

- Identify bottlenecks that create additional work or lengthen the process lead-time of the customer business process.
- Challenge the customer to rethink its business processes.
- Make recommendations about how to improve processes.
- Bring knowledge that the customer lacks, such as knowledge about organizational change management, and recommend when to use a point solution rather than a platform solution.

Only senior level experts are able to act in a role that requires the preceding skills.

“They have the seniority to be able to do it and that is what we want.” (Customer 8, 2011)

A VAR creates value for its customers by listening to the customer ideas and feedback, and taking them into account when developing its own products and services, or even forwarding them to its PLM system supplier. Pioneering customers that come from a PLM immature industrial sector, see value when a VAR is able to get its PLM system supplier interested in the industry. Additional value is created when the supplier develops industry-specific products or product features. The value creation potential is even higher if a VAR, as member of a customer’s delivery network, cooperates with other suppliers to create a common offering for the customer.
The preceding within-unit analysis of the empirical data is aggregated in the list below, which lists the sources of the VAR-created value in the PLM systems context. A VAR creates value for its customers through:

- Its product and service offering.
- Its own information sharing capabilities.
- Its knowledge, expertise and experience.
- Its capability to act as a communication and feedback channel between its customers and PLM system supplier.
- Its capability to act as a member of customer’s delivery network and to cooperate with other suppliers.
- Being close to its customer, not only geographically, but also culturally.

**VAR-Perceived Value**

A customer creates value for a VAR just by being a customer. To be a creditable actor in the market, a VAR must have a sufficiently large customer base. In addition to paid financial compensation for delivered products and services, a customer creates value for a VAR when they provide references, which a VAR can use in for future sales.

“But I think the knowledge and the, maybe the value as being a reference to us is quite significant, if we do something very good for a customer, we could probably use that as a means to sell that to five more customers, with a higher profitability.” (VAR 3, 2011)

Every customer case is a learning opportunity for a VAR. In the optimal case, it is a two-way process and the VAR learns from the customer and the customer learns from the VAR. In PLM immature industrial sectors, a VAR brings technical and process know-how into an implementation project and a customer will bring business substance. If a customer challenges a VAR, it can be considered a learning opportunity because it forces the VAR to work even harder and smarter than usual to convince the customer.

**7.4.4 VAR-Customer Business Relationship**

The VAR-customer business relationship begins developing during the sales phase. The customer expects to see good spirit, which leads the VAR-customer
relationship toward a common target. If that part of the relationship is in order, the customer will be willing to accept minor faults or shortcomings.

“It is a good thing that we have a project manager and VAR’s experts, which we have met several times related to project. I could say that they are almost friends or colleagues to us. It is at good level, at excellent level. Email exchange and enquiries on daily basis and very professional level.” (Customer 5, 2011)

The product maintenance agreement creates business continuity for the VAR-customer business relationship. Another possibility for keeping the relationship vital is to ensure the customer’s PLM initiative has continuity.

“In my opinion we have well achieved what we wanted to and then on the way we have found whole time such things what we have wanted to and we have been able to implement them. This means that the system has improved in the course of time.” (Customer 4, 2011)

The VAR-customer business relationship is not visible to all members of customer’s PLM project. There will be specifically assigned people responsible for the relationship.

**VAR-Customer Business Relationship Value**

The VAR-customer business relationship creates value for a customer if the customer wants a delivery network and so avoids putting all its eggs in one basket by relying on a single supplier. A business relationship can act as a gate to a network for a customer, where it can share its experience with peers in the same situation.

The VAR-customer business relationship creates value for a VAR even if the relationship is put on hold after the sales phase. If a VAR has demonstrated good performance and the customer is satisfied with the VAR’s delivery, the relationship will act as a reference for future sales cases, but the customer must be able to present solid reasoning as to why the relationship was put on hold in spite of satisfactory deliveries.

The VAR-customer business relationship is a source for co-value creation, where something that is developed on a customer project is made available to other customers. Of course there are always certain financial arrangements
involved, but the basic idea is that the developed piece of software or configuration is not customer specific unless it is a real invention that can be patented, or a real competitive edge to the customer and which the customer wants to protect from use by others.
8 Cross-Unit Analysis

The following sections document the findings of the cross-unit analysis. Section 8.1 describes the supplier type categories. Next, the similarities and differences between the offering content of different supplier types (see Sections 8.2.1 and 8.2.2) are analyzed. Section 8.3 compares the business goals of different supplier types. The VAR’s business relationships with different supplier types are analyzed in Section 8.4. To finalize the cross-unit analysis of the supplier types, Section 8.5 describes the findings of the VAR-supplier value analysis.

As with the supplier cross-unit analysis, Section 8.6 describes the VAR category types. The VAR value creation strategy (Section 8.7), business model (Section 8.8), and value creation functions (Section 8.9) are analyzed across VAR types. The influence of the supplier types has been taken into account in the analysis.

The customer cross-unit analysis begins with a description of customer type categories (Section 8.10). The customer business goals (Section 8.11) and content of VAR offering (Section 8.12) are analyzed across customer types. The VAR-customer business relationship lifecycle is analyzed in Section 8.13. To finalize the customer cross-unit analysis, the VAR-customer value is analyzed across business relationship lifecycle stages in Section 8.14. Section 8.15 aggregates the cross-unit analysis. The model of VAR value creation in the PLM systems context (see Fig. 9) is revised according to the findings of the cross-unit analysis and presented in Fig. 16.

8.1 VAR’s Main Supplier Types are PLM Vendor and Supplier

In the PLM systems context, the product and service offering that suppliers offer to VARs is used as a basis for supplier categorization. There are two main supplier types: the PLM system supplier and other suppliers. To make clearly differentiate between these two main supplier types in the research at hand, the term PLM vendor is used to denote the PLM system supplier, and the term supplier is used to denote other suppliers.
8.2 Supplier Offering Varies from PLM System Platform to Project Resources

The PLM vendor’s product and service offering is the PLM system platform and possibly other complementary products and services. A supplier’s offering is more fragmented. It can vary from very project or customer-specific programming or configuration through resource selling, to ready-made building blocks, and even to services like SaaS.

The supplier types in the PLM systems context were identified during the within-unit analysis (see Summary in Section 7.2). Respectively, the content of the supplier offering was aggregated as a result of the supplier offering within-unit analysis (see Summary in Section 7.2.1). The following sections will provide an analysis first of the PLM vendor’s offering and then of the supplier’s offering.

8.2.1 PLM Vendor Offering Is Based on PLM System Platform

The PLM vendor is more of an IT and software provider than a service provider. If the PLM vendor’s service organization is small in size, it does not have enough capacity to serve all its customers, which leaves room for VARs and other business actors to conduct their business. There is always the danger that if a PLM vendor has its own service organization it will end up competing with its VARs. On the other hand, it might be challenging for a vendor to master both a software and service business, as software business requirements differ from service business requirements.

The PLM vendor has three platform products: the PLM system platform, the engineering tool, and the standalone platform, each of which have different positions in the PLM concept. In the research at hand, the term **PLM system platform** is used to denote any of the preceding platform products. In addition to the PLM system platform, the PLM vendor offering includes complementary products that complement or extend the functionality of the PLM system platform.

The PLM vendor’s service offering consists of training and technical support, which is targeted to the VARs and to customers. In the research at hand, the term **services** is used to denote any type of service targeted to customers. Marketing and sales support and business opportunities are also part of the service offering to VARs. Information sharing is considered to be an integral part of every element of the offering.
8.2.2 Supplier Offering has Large Variation in Content

A Supplier can be categorized further using its product and service offering to VARs as the basis. A *product supplier* offers ready-made building blocks or extensions to the PLM system platform or to the VAR’s own product. We categorize a supplier that offers additional services on top of or as a complement to a VAR’s own service offering as a *service supplier*. A service offering could be coding, configuring, testing, common SW development, and implementation services, but it can also be training or even a SaaS type of service. Service might even be an entire implementation project for the customer, i.e., a turnkey delivery.

One supplier category is *resource supplier*, which offers resources to a VAR, most commonly on an hourly basis. A PLM vendor provides resources to its VARs, but it is an integral part of marketing and sales support to its VARs and not a service type of its own. A supplier that offers special skills and knowledge in basic software coding and maintenance practices is categorized as an *R&D supplier*. A supplier can be a *peer company*, which means that a VAR has a supply relationship with another VAR of a common PLM vendor. The cooperation between the VAR and a peer company is not necessarily only marketing and sales cooperation. It can be cooperation for use of a product and service where the VARs include each other’s products and services as part of their own offering.

A supplier may belong to several supplier types depending on the focal customer case. A supplier may be a resource supplier in one customer case and a service supplier in another customer case. The basic rule is that a supplier delivers whatever is agreed to between a VAR and its supplier in the customer case agreement. Final delivery is always project or customer specific. We refer only to the customer cases where a VAR owns the customer. There are also cases where the PLM vendor owns the customer and a VAR has a supplier role in it. Table 19 summarizes the VAR supplier types in the PLM systems context. It lists at a high level the supplier-specific product and service offerings.
Table 19. Main product and service offerings to a VAR in the PLM systems context according to supplier types.

<table>
<thead>
<tr>
<th>Supplier Offering</th>
<th>PLM Vendor</th>
<th>Product</th>
<th>Service</th>
<th>Resource</th>
<th>R&amp;D</th>
<th>Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM system platform</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLM system platform extensions (product)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLM system platform extensions (customer or project</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>specific)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Business opportunities</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Marketing and sales support</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the preliminary research framework (see Fig. 9), there were only suppliers as business actors. But in the revised model of VAR value creation in the PLM systems context (see Fig. 16), the suppliers business actor type is split into two business actor types, supplier and PLM vendor, which reflects the empirical data cross-unit analysis findings. The term Supplier Type is added to the revised model to indicate that inside the main business actor type of supplier there are several sub types (see Table 19).

### 8.3 Suppliers’ Business Goal is to Grow but Implementation Differs

The division into PLM vendor and supplier business actor types is visible also when viewing the supplier’s business goals. Both PLM vendor and supplier types have business growth as their business goal, but there is variation in the implementation strategy adopted. Company size is not a differentiator. The PLM vendor is a large global company, but a supplier can also be a global company, even a large global company.

The PLM vendor’s strategy is to grow using both its own sales force and its VAR channel. The PLM vendor plans to utilize the existing basic technology in new industries that either does not currently use PLM systems at all, or usage is minimal. It will build support for industry-specific business processes on top of the basic technology. It can build the required support by itself or it may acquire an existing company if the company has something that is interesting and fits into
the existing portfolio, or extends the portfolio in the direction stated in the strategy.

A supplier’s growth strategy relies on cooperation with a VARs, specialization in industry-specific topics (e.g., regulatory affairs of certain industrial sectors), and using existing special knowledge to extend into new industrial sectors. If a Supplier introduces a new business model or a new way of doing business in the PLM systems context, its approach may be to establish a new business by finding new customers in cooperation with a VAR.

8.4 VAR-Supplier Relationship – From Unequal to Win-Win-Win Relationship

The business relationship between a VAR and its PLM vendor is directed by the fact that it is not a relationship between equals. The prerequisite for the successful relationship is trust and common interest. The relationship develops over time. When the relationship becomes deeper and wider with respect to knowledge, the VAR’s business grows, and at the same time its value creation potential in favour of the vendor grows.

A VAR and the basic relationship with its supplier is a win-win-win business relationship, where the goal is that the customer wins, the supplier wins, and the VAR also wins. It is also a complementary relationship that completes the VAR’s offering, skills, and knowledge.

8.4.1 VAR-PLM Vendor Business Relationship has Several Building Blocks

Cooperation between a VAR and its PLM vendor is extensive. In a sales relationship, a VAR concentrates on selling and marketing its PLM vendor’s products. In a product relationship, a VAR and its PLM vendor cooperate in R&D. They can be suppliers to each other or work as partners in customer delivery projects. In an information-sharing relationship, a VAR needs to use the customer’s strategic importance to push the requirements through the vendor’s R&D organization. A VAR and its PLM vendor may also have a financing relationship where the vendor finances the VAR’s operations and perceives value as the return. In a service relationship a VAR takes care of certain parts of its PLM vendor’s service offering. A VAR and its PLM vendor may also have a
service supplier relationship, where the VAR offers services directly to its vendor’s customers.

From extensive cooperation between a VAR and its PLM vendor, a variety of business relationships can be distinguished. Table 20 lists the relationship types and gives a short PLM system context-specific characteristic for each type.

Table 20. VAR-PLM vendor business relationship types in the PLM systems context.

<table>
<thead>
<tr>
<th>VAR-PLM Vendor Business Relationship Type</th>
<th>PLM Systems Context-Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product relationship</td>
<td>Cooperation in product development.</td>
</tr>
<tr>
<td>Sales relationship</td>
<td>A VAR sells its PLM vendor’s products.</td>
</tr>
<tr>
<td>Service relationship</td>
<td>A VAR offers services that are based on and complete the PLM vendor’s product offering and.</td>
</tr>
<tr>
<td>Service supplier relationship</td>
<td>A VAR is a service supplier to the PLM vendor’s direct customers.</td>
</tr>
<tr>
<td>Financing relationship</td>
<td>A PLM vendor finances the VAR’s operations.</td>
</tr>
<tr>
<td>Information sharing relationship</td>
<td>A PLM vendor receives customer requirements through its VAR, for example.</td>
</tr>
</tbody>
</table>

In practice, a business relationship between a VAR and its PLM vendor is rarely only one type of relationship. It is more common that it is a combination of any of the types listed in Table 20. The relationship combination may change over time. The business agreement between the parties establishes a framework for the targets and limitations of the VAR-PLM vendor business relationship.

8.4.2 VAR-Supplier Business Relationship – From Competitive to Coopetitive

The analysis of VAR-supplier business relationship cannot be based only on the empirical data of the VAR-supplier relationship (see Section 7.3.4). There are elements from the empirical data of suppliers (see Section 7.2), supplier’s business goals (see Section 7.2.2), and supplier’s offering (see Section 7.2.1) that must be taken into account when completing the analysis.

A supplier wants to have an open relationship with a VAR. A VAR-supplier business relationship has a lifecycle. The relationship may be a reseller relationship where a supplier acts as a reseller or preferably, as a VAR for the VAR’s software product. Another type of relationship is more of a working relationship where the companies support each other with different types of
service activities, such as sharing resources and supporting customers together. In this category, several forms of cooperation can be identified.

A VAR has a coopetitive relationship with some of its suppliers. A coopetitive relationship is a supply relationship where the supplier delivers product components to a VAR. A VAR may have a coopetitive relationship with large global companies and the product offering may include a PLM system platform.

In a subcontractor type of relationship, a VAR has a permanent relationship with its supplier. A VAR and its supplier share a common parent company, an agreement, or any other type of arrangement that permanently secures the relationship. The vital feature of the relationship is that the companies are in no way competing against each other. Even if the relationship is a subcontractor relationship, there is always the potential for it to develop into a more cooperative direction.

Compared to reseller, coopetitive, and subcontractor relationships, the relationship types below are influenced by the focal VAR’s customer case. It means that depending on the VAR-customer’s relationship, a VAR-supplier relationship may be different. Whereas, if a VAR-supplier relationship is a reseller, a coopetitive, or a subcontractor relationship, the focal customer case can only add another relationship type on top of the original relationship.

In a competitive relationship, a supplier provides services to a VAR in a certain customer case and is a competitor in another case. In a cooperative relationship, the VAR and its supplier work in cooperation and in a managed way to create value for the focal customer.

VAR-supplier relationships should be managed systematically and as a relationship portfolio. VARs should actively scout the marketplace to find new suppliers as well as new business possibilities. A new relationship requires time, commitment, and work to develop. Quick wins are unlikely. In the development stage, the parties are looking for and developing forms of cooperation and operation in the relationship.

Table 21 summarizes the preceding discussion about VAR-supplier relationship types. It also gives a short description of the PLM systems context-specific characteristic of each relationship type.
Table 21. VAR-supplier business relationship types in the PLM systems context.

<table>
<thead>
<tr>
<th>VAR-Supplier Business Relationship Type</th>
<th>PLM Systems Context-Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive relationship</td>
<td>In a customer case, a VAR and its supplier cooperate, but in another they compete against each other to get the customer.</td>
</tr>
<tr>
<td>Cooperative relationship</td>
<td>In a customer case, a VAR and its supplier cooperate to create added value for a customer, but in another they act as independent suppliers.</td>
</tr>
<tr>
<td>Coopetitive relationship</td>
<td>A VAR and its supplier have both competitive and cooperative elements in their relationship.</td>
</tr>
<tr>
<td>Reseller relationship</td>
<td>A supplier is a reseller or a VAR of another VAR’s software product.</td>
</tr>
<tr>
<td>Subcontractor relationship</td>
<td>A supplier is a subcontractor to a VAR.</td>
</tr>
</tbody>
</table>

In the preliminary research framework (see Fig. 9) there was only a VAR-Suppliers business relationship. But in the revised model of VAR value creation in the PLM systems context (see Fig. 16), the relationship is split into two relationships: the VAR-Supplier and VAR-PLM vendor to reflect the findings of the empirical data within-unit and cross-unit analyses (see Table 20 and Table 21).

8.5 VAR-Supplier Value is Financial, Knowledge Sharing, and Strategic Value in Nature

VAR-Supplier value consists of supplier-created value (see Supplier-Created Value in Section 5.2.3), supplier-perceived value (see Supplier-Perceived Value in Section 5.2.3), coopetitive-created value (see Coopetitive- Created Value in Section 4.1.2), and VAR-supplier business relationship value (see VAR-Supplier Business Relationship Value in Section 5.3.4).

As part of the VAR-supplier value analysis, the value sources were identified during the within-unit analysis (Section 7.2.3). According to the findings of the analysis of supplier offering (Section 8.2) and the analysis of VAR-supplier business relationship (Section 8.4), they are both very much dependent on the supplier type (see Table 19). The VAR-supplier value is categorized according to supplier type to indicate the value created or value perception.

Although the scope of the research at hand is VAR value creation, the supplier-created value is included in the analysis because the supplier value creation potential especially impacts which suppliers a VAR selects to include in its supply network.
8.5.1 Supplier-Created Value is Cost Reduction, Improved Quality, and Productivity in Nature

The PLM vendor creates value for its VARs through its company and product brands. Well known brands reduce the transaction costs and shorten the negotiation time because customers already know both the company and the products. Both preceding values have a direct effect on sales costs of the VAR. A well-known brand creates trust and credibility among a VAR’s customers, which positively affects VAR-customer business relationship building. Company and product brands give a VAR the possibility to generate higher margins, but margin generation is strongly dependent on the terms of the business agreement between the PLM vendor and the VAR. The PLM vendor is naturally committed to promoting its own product, as it is the core of its business.

The PLM system platform increases the VAR’s productivity because the tested basic functionality that customers need is already available. The PLM system platform is also an enabler for a VAR’s high quality and reliable customer delivery. A PLM vendor assures the design, continuous improvements, and market competitiveness of its PLM system platform. Product guarantee arrangements go along with the platform. A PLM vendor provides PLM system platform training to its VARs so they may efficiently use the platform and sell it to their customers.

A PLM vendor offers a marketing and sales channel to its VARs for their own products. An additional, new sales channel is an enabler for a VAR to improve its productivity and financial performance. A sales channel that the PLM vendor organizes and manages will naturally cut the sales costs for the VARs. On the other hand, the reseller business relationship between a VAR and its supplier requires investment, time, and resources from both parties. The PLM vendor-managed sales channel and reseller relationship with a supplier increases the number and frequency of managerial contacts between a VAR and its PLM vendor or supplier. It improves the perception of added value.

Customer references give a VAR the possibility for differentiating itself in the markets. Customer references may shorten the negotiation time, which may generate savings in transaction and sales costs. The experience of other customers creates the trust and credibility of the products and the VAR among new customers. The Supplier’s customer references are as valuable to a VAR as its PLM vendor’s references, but the number of the references is smaller.
New business opportunities, no matter whether they come from a VAR’s PLM vendor or a VAR’s suppliers, will improve the VAR’s productivity and financial performance. The Supplier’s knowledge about its customers, competitors, and markets creates value, but it also increases the perception of added value through frequent contact at all levels of the organization.

Resources, no matter if they are from the PLM vendor or supplier, improve a VAR’s productivity because a VAR can plan its sales activities and customer deliveries by relying on fact that the best and most knowledgeable resources are available. The cooperation with respect to resources may also increase the perception of added value because it forces not only frequent managerial contacts, but also organizational-level contacts to synchronize the common resource pool.

Suppliers extend a VAR’s market presence geographically. All VAR-supplier relationship types (see Table 21) do this. Extended market presence improves financial performance by increasing the number of new sales cases, and lowers sales costs through cooperation with a supplier. There is the possibility for increasing the perception of added value if the cooperation is well planned.

The R&D cooperation between a VAR and its supplier improves a VAR’s productivity, especially in the case where results of the cooperation is something that completes the VAR product and service offering for its customers. It also forces the parties to have frequent contact at all levels of the organization, and thereby increases the perception of added value.

Table 22 summarizes the cross-unit analysis of the supplier-created value in the PLM systems context. It lists the value sources in the PLM systems context identified during the within-unit analysis (see Supplier-Created Value in Section 7.2.3). The value sources are analyzed according to the definition of supplier-created value in the preliminary research framework (see Supplier-Created Value in Section 5.2.3). Supplier type (see Table 19) specific value potential is assessed.
## Table 22. Supplier-created value in the PLM systems context.

<table>
<thead>
<tr>
<th>Value Source in the PLM systems context</th>
<th>Supplier-Created Value</th>
<th>Supplier Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company and product brand</td>
<td>Reduced transaction costs</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Reduced negotiation time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower selling costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relationship of trust and credibility with customer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Possible higher margins on strongest brands</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier commitment to promote the product</td>
<td></td>
</tr>
<tr>
<td>PLM system platform</td>
<td>Increased productivity and financial performance</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Product quality, reliability, and price/cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Product profitability, line assortment, guarantees, physical design, product improvements and innovations, and market competitiveness of the product</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relationship-specific investments</td>
<td></td>
</tr>
<tr>
<td>Additional sales channel</td>
<td>Increased productivity and financial performance</td>
<td>X X</td>
</tr>
<tr>
<td></td>
<td>Lower selling costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased perception of added value in a channel relationship</td>
<td></td>
</tr>
<tr>
<td>Customer references</td>
<td>Reduced transaction costs</td>
<td>X X</td>
</tr>
<tr>
<td></td>
<td>Reduced negotiation time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower selling costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relationship of trust and credibility with customer</td>
<td></td>
</tr>
<tr>
<td>New business opportunities</td>
<td>Increased productivity and financial performance</td>
<td>X X</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Greater access to current knowledge about competitors, customers, and other institutes</td>
<td>X X</td>
</tr>
<tr>
<td></td>
<td>Increased perception of added value in a channel relationship</td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>Increased productivity and financial performance</td>
<td>X X</td>
</tr>
<tr>
<td></td>
<td>Increased perception of added value in a channel relationship</td>
<td></td>
</tr>
<tr>
<td>Extended market presence</td>
<td>Increased productivity and financial performance</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Lower selling costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased perception of added value in a channel relationship</td>
<td></td>
</tr>
<tr>
<td>R&amp;D cooperation</td>
<td>Increased productivity and financial performance</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Increased perception of added value in a channel relationship</td>
<td></td>
</tr>
</tbody>
</table>
8.5.2 Supplier-Perceived Value is Performance-Related

A VAR extends its PLM vendor’s and supplier’s market presence. In addition, the VAR channel is cheaper than the vendor’s own sales channel. Both improve company performance, but also help gain access to new markets and third parties.

A VAR is physically closer to the customer than its PLM vendor, but also in the sense that it knows its customers and their markets. It is easier to access the markets and get information about the markets as well as about the customers, but it is also a gateway for finding third parties (e.g., authorities and industrial interest groups).

A VAR’s ability to create new business possibilities for its PLM vendor and its suppliers naturally improves their performance, but can also help gain access to new markets. An open feedback loop between a VAR and its PLM vendor delivers critical market information to the vendor. It also builds actual customer trust toward the PLM vendor and the VAR when the customer notices that their feedback and requirements have been taken into account. If a supplier is the same sized company as the VAR, it is as close to a customer as the VAR is.

As a relatively small company, a VAR has the business agility to fulfill a customer’s requirements faster than its PLM vendor. This creates happy customers. Happy customers will also create business potential for the PLM vendor. A VAR’s business agility is visible during the process of introducing new products or new product features. VARs know their markets and their customers; this enables them to select the best target audience for introducing a new product or feature.

A VAR’s product and service offering may include products and services from its suppliers. The offering is complementary in nature. It complements or extends the PLM vendor’s product offering and makes the products applicable to a larger customer base, which impacts the PLM vendor’s as well as the suppliers’ business performance. Through its business agility and market knowledge, a VAR is a gateway for its suppliers to locate new customers. The cooperation between a VAR and its supplier may act as a market differentiator, which improves the supplier’s performance. A supplier may use a VAR’s customer references in its sales cases to improve business performance.

Table 23 summarizes the cross-unit analysis of supplier-perceived value. It lists the value sources identified during the within-unit analysis (see Supplier-Perceived Value in Section 7.2.3). The value sources are analyzed according to
the definition of supplier-perceived value in the preliminary research framework (see Supplier-Perceived Value in Section 5.2.3). Supplier-type-specific (see Table 19) value creation is assessed.

Table 23. Supplier-perceived value in the PLM systems context.

<table>
<thead>
<tr>
<th>Value Source in the PLM Systems Context</th>
<th>Supplier-Perceived Value</th>
<th>Supplier Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PLM Vendor</td>
</tr>
<tr>
<td>Extended market presence</td>
<td>Company performance</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Gain access to new markets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Access to third parties</td>
<td></td>
</tr>
<tr>
<td>Market and customer knowledge</td>
<td>Gain access to new markets</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Gain critical market information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Access to third parties</td>
<td></td>
</tr>
<tr>
<td>New business opportunities</td>
<td>Company performance</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Gain access to new markets</td>
<td></td>
</tr>
<tr>
<td>Feedback loop</td>
<td>Relationship of trust with customer</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Gain critical market information</td>
<td></td>
</tr>
<tr>
<td>Business agility</td>
<td>Company performance</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Easier introduction of new products</td>
<td></td>
</tr>
<tr>
<td>Product and service offering</td>
<td>Company performance</td>
<td>X</td>
</tr>
<tr>
<td>Customer gateway</td>
<td>Company performance</td>
<td>X</td>
</tr>
<tr>
<td>Market differentiator</td>
<td>Company performance</td>
<td>X</td>
</tr>
<tr>
<td>Customer references</td>
<td>Company performance</td>
<td>X</td>
</tr>
</tbody>
</table>

8.5.3 VAR-Supplier Business Relationship Value is Strategic and Financial in Nature

A prerequisite for a VAR-PLM vendor business relationship is profitability for both parties, which leads to financial and strategic values. But it makes both parties be concerned about each other’s profitability. A VAR’s relationship to both the PLM vendor and supplier enables new business opportunities, which has financial and strategic value. This value creation is bidirectional. A creditable business relationship between a VAR and its PLM vendor creates strategic value, but it also shows mutual commitment to customer satisfaction. Suppliers as smaller companies cannot create that type of credibility on their own.

A VAR-supplier business relationship creates a common customer base that through its new business possibilities adds strategic and financial value. A common customer base is more important to a supplier than to a PLM vendor.
The common knowledge base that is created through such a business relationship creates knowledge value through cooperative knowledge sharing, but it is also of strategic value, especially when competing for new customers. It enables mutual commitment to customer satisfaction because the common knowledge base most probably satisfies the customer knowledge requirements better than knowledge of a single company. A common knowledge base is as important to the PLM vendor as it is to the supplier and VAR.

Commonly, customer references available through the business relationship create strategic value, which is especially important when competing for new customers. As with a common customer base, the customer references are more important to suppliers and to the VAR than to the PLM vendor.

A well known product brand to which a business relationship creates a connection is a strategic value, especially during the sales phase, but it is an assurance of product quality during the customer delivery phase. In a VAR-PLM vendor relationship, the product brand owner is the vendor. But in a VAR-supplier relationship, the owner is the VAR.

A well known company brand creates strategic value in the same way that a product brand does. In the PLM systems context, the PLM vendor’s company brand is better known than any of the supplier’s brands because most commonly suppliers are rather small companies.

A VAR’s relationship with a supplier makes customer deliveries more predictable. First, a supplier’s way of doing business is to commit to what they have promised. Second, cooperation between a VAR and its suppliers enables realistic customer delivery planning. Both of these topics are evidence of mutual customer satisfaction. Predictability creates financial value because the better the customer delivery meets the targets (i.e., financial, quality, time schedule, etc.) the more likely it is that the customer will be a source of repeat business in the future.

Improvements in customer requirement fulfillment and improved R&D capability are closely connected to how the business relationships between a VAR and its suppliers work. Both improvements create strategic value because the target of a VAR and its supplier’s, if it has direct customers, is to create value for its customers. The improvements are closely connected to customer satisfaction.

Table 24 summarizes the cross-unit analysis of the VAR-supplier business relationship value. It lists the value sources in the PLM systems context identified during the within-unit analysis (see VAR-Supplier Business Relationship Value in Section 7.3.4). The value sources are analyzed according to the definition of the
VAR-supplier business relationship value in the preliminary research framework (see VAR-Supplier Business Relationship Value in Section 5.3.4). The supplier-type-specific (see Table 19) value creation is assessed.

Table 24. VAR-supplier business relationship value in the PLM systems context.

<table>
<thead>
<tr>
<th>Value Source in the PLM Systems Context</th>
<th>Relationship Value</th>
<th>Supplier Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitable business</td>
<td>Financial value</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Concern of others profitability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategic value</td>
<td></td>
</tr>
<tr>
<td>New business opportunities</td>
<td>Financial value</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Strategic value</td>
<td>X</td>
</tr>
<tr>
<td>Credibility</td>
<td>Mutual commitment to customer satisfaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategic value</td>
<td></td>
</tr>
<tr>
<td>Common customer base</td>
<td>Financial value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategic value</td>
<td>X</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Knowledge value</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Strategic value</td>
<td></td>
</tr>
<tr>
<td>Customer references</td>
<td>Strategic value</td>
<td>X</td>
</tr>
<tr>
<td>Product brand</td>
<td>Strategic value</td>
<td>X*</td>
</tr>
<tr>
<td></td>
<td>Product quality</td>
<td>X**</td>
</tr>
<tr>
<td>Company brand</td>
<td>Strategic value</td>
<td>X</td>
</tr>
<tr>
<td>Predictability of engagements</td>
<td>Financial value</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Strategic value</td>
<td></td>
</tr>
<tr>
<td>Improved customer requirement</td>
<td>Strategic value</td>
<td>X</td>
</tr>
<tr>
<td>fulfilment</td>
<td>Mutual commitment to customer satisfaction</td>
<td></td>
</tr>
<tr>
<td>R&amp;D capability improvement</td>
<td>Strategic value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mutual commitment to customer satisfaction</td>
<td>X</td>
</tr>
</tbody>
</table>

* PLM Vendor is the product brand owner.
** VAR is the product brand owner.

8.6 Market, Portfolio, and Functional Focus Determines VAR Type

A VAR has diverse relationships with different suppliers and obviously with different customers. A VAR can serve certain customers directly with its products, some in cooperation with its PLM vendor and even some in cooperation with suppliers and other VARs. For services, VARs may in general sell directly to any customer, regardless of size or other customer characteristic.
The VAR’s role in the PLM systems context is to fully understand its PLM vendor’s offering, to understand customer requirements, to compare the offering against the requirements, and to fulfil the potential gap in the requirements by either using its own products and services, by using other suppliers’ products and services, or using both.

A reseller type of VAR focuses on selling its PLM vendor’s products, and in some cases other suppliers’ products as well. To be successful at selling software in the PLM systems context, a profitable service business along with experienced engineers is required in order to deliver services successfully. Reseller VARs and hybrid VARs that have both a sales and service function, compete against suppliers specialized in services. The product organization VAR type has its own product. It offers it as single product to its customer or as integrated with its PLM vendor’s product.

Fig. 13 summarizes the preceding analysis of VAR types in the PLM systems context. A hybrid VAR is any mixture of software reseller, service organization, or product organization VAR. Any VAR type can be either regionally focused or industry focused; this focus is primarily decided in the business agreement between a VAR and its PLM vendor. A VAR may have both a regional and industry focus. Any VAR type can be a representative of the full product portfolio of the PLM vendor or it can represent only a partial portfolio; this is decided in the business agreement between the VAR and its PLM vendor.
Fig. 13. VAR types in the PLM systems context.
In the preliminary research framework (see Fig. 9), only the VAR was considered a business actor. But in the revised model of VAR value creation in the PLM systems context (see Fig. 16), according to the empirical data cross-unit analysis findings, there are several sub types of the VAR to which the term ‘VAR type’ refers (see Fig. 13).

8.7 PLM Vendor Sets a Framework for VAR Value Creation Strategy

The successful VARs have a value creation strategy behind what they do and they focus on the things they know they are good at and try to avoid doing everything. In principle, the PLM vendor defines the value creation strategy framework for its VAR’s strategy. The vendor may periodically have a process for building the strategy plan together with its VARs. A VAR’s value creation strategy is a matter of synergy and synchronization.

The challenge in a VAR’s value creation strategy is that a VAR does not own the product, i.e., the PLM system platform software that it sells. This means that all strategic decisions regarding the platform must be related to and is dependent on the PLM vendor’s strategic decisions. From a VAR’s point of view, the fact that the PLM vendor expects its VARs to be dedicated solely to its products is a strategic risk. Basing a business on a single vendor or product is always a business risk.

If the PLM vendor’s strategy allows or directs rivalry between its network actors, the actors may be rivals with each other or the vendor itself may compete against its network actors. The informants see that to maximize the value of the ecosystem and to create new business for all ecosystem members instead of fostering rivalry in the ecosystem, the focus should be on marketing cooperation and PLM system brand building.

A VAR’s customer-perceived and supplier-perceived value creation strategies are dependent on the VAR type (see Fig. 13). It is not only dependent on whether a VAR wants to be a software reseller, service organization, product organization, or a hybrid VAR; it is also dependent on the focus of the VAR (see Fig. 13). Both the customer PLM maturity as well as the customer’s industrial sector PLM maturity impacts a VAR’s value creation strategy. A strategy that focuses on specific industries and develops a deep understanding and knowledge about these industries can be seen as a defensive strategy against low-cost players and against the PLM vendor’s own service organization.
A VAR’s customer-perceived value creation strategy needs to include both static and dynamic elements so the VAR can quickly react to changes in its market or the business model changes of its customers. A VAR must consider the strategy it wishes to adopt: Is the strategy to establish international functions or create a network with other VARs and in cooperation provide support to the customer? Or is the strategy something else? A VAR’s business strategy may be to find areas of business or customers who have been forced to change their operating model in a dynamic demand situation. By offering PLM systems and services, VARs can help customers make such an inevitable change easier.

If a VAR wants to be a reseller organization, it must differentiate itself from other resellers of the PLM vendor. A reseller VAR may have a strategy that focuses on selling software in order to also sell its own engineering services as well. Another type of strategy is to focus more on maximizing software sales and minimizing engineering service hours. If a VAR uses its own product offering as a differentiator, the VAR must include in its strategy how it will do this when the PLM vendor’s offering still forms the basis for the total offering. A VAR’s value creation strategy can be based on a tendency toward creating strategic partnerships with customers or, in other words, to move into a higher position within a customer’s value chain, which will mean long-term cooperation with the customer.

A VAR service delivery strategy varies from hour-by-hour based pricing to a fixed price project delivery. As part of the delivery strategy, a VAR can include a strategy to use a case-by-case supply network, to have a more permanent supply network, or to use both network alternatives depending on a specific customer case. If a VAR develops a product or only a piece of a product, it will need an R&D strategy.

8.8 VAR's Business Model is not One-Fit-for-All Model

A PLM vendor’s strategy will include certain expectations about what its VAR business model should be, which means that both the VAR’s value creation strategy and business model must be synchronized with the PLM vendor’s strategy and expectations. Changes in software products and the business model will also reflect the PLM systems business. Currently, the most common software business model is that suppliers sell licenses to new customers. The SaaS type of business model is making an entry into PLM systems markets. A new model that includes PLM systems tools that are purchased only for a certain project is
beginning to emerge. In this model, when the project is over, all tools are released. The vendor believes that there is still room for the VAR business in the PLM systems context, but whether VARs include software as a service in their service offering remains to be seen.

In the PLM systems context, a VAR’s value proposition consists of the value, the product, and the service portfolio it creates. The context-specific characteristic of a VAR’s value proposition is that the value is always connected to improvements in customer performance (e.g., product cost reduction, productivity improvement, unit component reduction). It is also related to the improved ability to reuse components and products. The value proposition is also related to improved information sharing and traceability inside the company and also between companies. The PLM systems can also be used to improve operational, product, and process quality. The process quality means, for example, fulfilling the requirements of an industry that is either regulated (e.g., the pharmaceutical industry) or an internally regulated industry (e.g., the automotive industry). Customer delivery is part of a VAR’s service offering. Fast and exact customer deliveries create value for customers and together with customer performance improvements, they improve the ROI.

A VAR’s product and service strategy is customer-oriented and is done in cooperation with the customer. It is partly cost sharing with customers and partly self-financed. It is at least partly restricted by the PLM vendor’s PLM product and service strategy.

If one were to describe a VAR’s target customer base with one word, the word would be fragmented. There is large variation in size of customers. Customers come from a wide range of industrial sectors. The public sector customers represent a minority. The PLM maturity of industrial sectors varies widely, in the same way the PLM maturity of customers varies. Customer activeness ranges from zero to continuous.

The VAR’s marketing model consists of the VAR’s own marketing activities and its cooperation with the PLM vendor. Social media does not have a big role in the model. The driving force of a VAR’s sales model is to find profitable customer projects. The typical sales cycle is long, but there is variation according to customer size and PLM maturity. Selling in the PLM systems context is more about selling ideas and values than selling physical products. Laws and regulations establish a framework for the sales model directed at the public sector.
The PLM vendor’s service model and customers’ SLA agreements create a framework for the VAR’s service model. A VAR may have its own support organization through which to offer productized maintenance services. A VAR’s customer relationships can be characterized as being cooperative and long-term in nature, and they have several lifecycle phases. They are based on mutual trust.

The information model is either part of the customer relationship governance model or a personal level relationship. Different types of customer surveys are used. The delivery model relies on customer-specific delivery projects that follow either a fixed price or hour-by-hour pricing model. SaaS and software license leasing are used, but are not that common.

A VAR’s partner network in the PLM systems context can be characterized by saying that the business agreement between the parties controls the VAR-PLM vendor relationship. The VAR-Supplier relationship is more informal and it is guided by the parties’ suitability to each other, the parties’ vision commonalities, and alignment of business culture. The primary expenses of a VAR are its personnel costs. A VAR’s revenue model is a combination of software license sales, service sales, and software maintenance.

Table 25 summarizes the cross-unit analysis of the VAR’s business model elements in the PLM systems context. The names and grouping of business model elements, and their building blocks come from the preliminary research framework (see Section 5.3.2 and Table 18). The table lists the building blocks of the business model element types identified during the within-unit analysis (see Section 7.3.2). For each building block, the PLM systems context-specific characteristics are noted.
Table 25. VAR’s business model elements in the PLM systems context.

<table>
<thead>
<tr>
<th>Business Model Element</th>
<th>Building Block</th>
<th>PLM Systems Context-Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product and services</strong></td>
<td>Value proposition</td>
<td>Improvement of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Company performance,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Innovation reuse,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product and process quality, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business information sharing, quality and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>traceability.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Return on investment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast and exact deliverables.</td>
</tr>
<tr>
<td><strong>Product and service</strong></td>
<td>strategy</td>
<td>Customer-oriented.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In cooperation with customers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost sharing-mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restricted by the PLM vendor’s product and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>service strategy.</td>
</tr>
<tr>
<td><strong>Customer interface</strong></td>
<td>Target customers</td>
<td>Broad range of industrial sectors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public sector customers represent a minority.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large variation in size.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large variation in PLM maturity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wide variation in relationship activity level.</td>
</tr>
<tr>
<td><strong>Marketing model</strong></td>
<td></td>
<td>Own marketing activities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marketing cooperation with the PLM vendor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social media not important.</td>
</tr>
<tr>
<td><strong>Sales model</strong></td>
<td></td>
<td>Driving force is to find good projects.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long sales cycle with variation according to customer size and PLM maturity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selling ideas and values.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Division into private sector and public sector model.</td>
</tr>
<tr>
<td><strong>Service model</strong></td>
<td></td>
<td>PLM vendor’s service model is framework.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own organization unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Service level agreement with customers.</td>
</tr>
<tr>
<td><strong>Relationship</strong></td>
<td></td>
<td>Cooperative relationships.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Common trust.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long-term relationships.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationships with a lifecycle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationship success corresponds to customer profitability.</td>
</tr>
<tr>
<td><strong>Information strategy</strong></td>
<td></td>
<td>Direct customer contacts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer satisfaction surveys.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relationship governance model.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Systematic approach does not always exist.</td>
</tr>
<tr>
<td><strong>Delivery model</strong></td>
<td></td>
<td>An hour-by-hour priced project or fixed price delivery</td>
</tr>
<tr>
<td>Business Model Element</td>
<td>Building Block</td>
<td>PLM Systems Context-Specific Characteristics</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Partner network</td>
<td>VAR-PLM vendor relationship is controlled by business agreement and yearly business plan. Relationship to suppliers is informal and based on parties’ business fit.</td>
</tr>
<tr>
<td>Infrastructure management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial aspects</td>
<td>Cost structure</td>
<td>Main cost is personnel cost.</td>
</tr>
<tr>
<td></td>
<td>Revenue model</td>
<td>PLM vendor’s product license sales. Own product license sales. Service sales. Maintenance sales. PLM vendor’s pricing model forms a framework.</td>
</tr>
</tbody>
</table>

Only a few building blocks are missing compared to the list of building blocks in the preliminary research framework (see Table 18). In the PLM systems context, the implementation model is quite close to the delivery model as it defines the activities needed to implement and deploy a software product as a working solution. Value configuration describes the arrangement of activities and resources. The core competency outlines the competencies necessary to execute the company’s business model. There was a significant amount of data in the empirical data about the knowledge requirements of VAR resources. It seems that the informants did not consider it to be part of the business model. Although the profit model is missing from the list, it is somewhat covered by both the cost structure and revenue model, which are included in the list. By definition, the profit model is a result of the difference between a revenue model and a cost structure.

8.9 VAR’s Value Creation Functions – Demand for Knowledge, Expertise, and Experience

Although larger VARs have their own marketing function, it is always a shared function with the PLM vendor. Like the marketing function, the sales function can be shared or its own function, but its content is always customer-case-specific. The sales function transfers the value that the PLM vendor creates to its customers. A VAR’s sales function is solution-oriented, which creates a concrete and realistic vision about the VAR’s offering. The sales function requires the
expertise and knowledge of the people involved in it. Innovative and knowledgeable implementation of the sales function is a way to differentiate the company from its competitors. It requires IT support as with any other function. The sales function is a generator of VAR-supplier relationship development. As the customer case stages progress, the expert and consulting functions play a progressively bigger role in developing the relationship.

If a VAR has its own product or products in addition to its PLM vendor’s product, a VAR will have a product and service development function, but the function is rather small in terms of overall business operations. The function is customer focused and requirements come mainly from customers and authorities. Product and service development requires a product management function.

The VAR has a delivery function that is responsible for executing customer-specific delivery projects. VARs have services like consulting and training that can be delivered as a project, but VARs also have service support functions, including service centres and SaaS services and each requires their own type of delivery function. Both preceding delivery modes require a robust process definition, although the final time and resource plan is completed on a case-by-case basis in a realistic manner. The delivery function has a high knowledge and internal information-sharing requirement. Service deliveries like support or SaaS service should be protected from any interruptions.

The VAR’s human resource management function grows senior level experts, which is what existing customers expect. The VAR should have efficient internal knowledge transfer and information sharing, especially if it is a multi-site organization. The VAR should have internal training about industry-specific processes and terminology to ensure provision of quality service, such as customer training.

Table 26 summarizes the cross-unit analysis of the VAR’s value creation functions in the PLM systems context. The names of the value creation functions are from the preliminary research framework (see Section 5.3.3 and Table 17). The table lists the value creation functions identified during the within-unit analysis (see Section 7.3.3). Beside each function, the PLM systems context-specific characteristics and additional notes, if any, are listed.
<table>
<thead>
<tr>
<th>Value Creation Function</th>
<th>PLM Systems Context-Specific Characteristics</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing and sales</td>
<td>In cooperation and synchronized with</td>
<td>Emails.</td>
</tr>
<tr>
<td></td>
<td>corresponding functions of the PLM vendor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sales:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Partly shared with a PLM vendor.</td>
<td>System demonstration.</td>
</tr>
<tr>
<td></td>
<td>Always customer-case-specific.</td>
<td>Quick and complete</td>
</tr>
<tr>
<td></td>
<td>Company size corresponds to organization inside a VAR.</td>
<td>understanding of customer needs.</td>
</tr>
<tr>
<td></td>
<td>Requires information tool support.</td>
<td>Customer business evaluations.</td>
</tr>
<tr>
<td></td>
<td>Requires expertise and knowledge.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Way to differentiate company from competitors.</td>
<td>Concept proposals.</td>
</tr>
<tr>
<td></td>
<td>Solution-oriented.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creates concrete and realistic vision about the offering.</td>
<td>Reference visits and phone calls.</td>
</tr>
<tr>
<td></td>
<td>Driving force for VAR-supplier relationship.</td>
<td>Supporting IT tools.</td>
</tr>
<tr>
<td>Product and service</td>
<td>R&amp;D function if VAR has its own product.</td>
<td>Requirements come from legislation and customers.</td>
</tr>
<tr>
<td>development</td>
<td>Customer focused.</td>
<td></td>
</tr>
<tr>
<td>Product and service</td>
<td>Requires product management function.</td>
<td>Realistic and accurate resource and schedule estimations.</td>
</tr>
<tr>
<td>service delivery</td>
<td>Case-by-case organized delivery project.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High knowledge and information sharing requirements.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery process definition exists.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Secured continuity for service deliveries.</td>
<td></td>
</tr>
<tr>
<td>Human resource</td>
<td>Internal training and competence development function for growing senior level and multitalented experts.</td>
<td>Industry specific terminology.</td>
</tr>
<tr>
<td>management</td>
<td>Efficient internal knowledge transfer.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal industry specific training.</td>
<td></td>
</tr>
<tr>
<td>Firm infrastructure</td>
<td>Ordering and invoicing are business as usual.</td>
<td>See Firm Infrastructure in Section 7.3.3.</td>
</tr>
<tr>
<td></td>
<td>Quality function is valued only if it offers improvements to the quality of customer’s PLM initiative.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other functions exist.</td>
<td></td>
</tr>
</tbody>
</table>
### Value Creation Function

<table>
<thead>
<tr>
<th>Function</th>
<th>PLM Systems Context-Specific Characteristics</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAR’s network</td>
<td>VAR-PLM vendor relationship is an unequal relationship.</td>
<td>See VAR-PLM Vendor Business Relationship in Section 8.4 and Table 20.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite for VAR-PLM vendor relationship is trust and common interest.</td>
<td>See VAR-Supplier Business Relationship in Section 8.4 and Table 21.</td>
</tr>
<tr>
<td></td>
<td>VAR-supplier relationship is a win-win-win business relationship.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VAR-supplier relationship is a complementary relationship.</td>
<td></td>
</tr>
<tr>
<td>Scout</td>
<td>Direct contact with customers is the most efficient way to collect information.</td>
<td>See Information Strategy in Section 7.3.2, Section 8.8, and Table 25.</td>
</tr>
<tr>
<td></td>
<td>Customer surveys.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part of relationship governance model.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In general, no systematic approach exists.</td>
<td></td>
</tr>
<tr>
<td>Market-signalling</td>
<td>PLM vendor is the esteemed supplier.</td>
<td>See Supplier-Created Value in Section 7.2.3</td>
</tr>
<tr>
<td></td>
<td>It is well known among the VAR’s customers and customer candidates.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Product offering with related support concept of PLM vendor appeals to potential customers of VARs.</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>PLM vendor’s product and tool documentation.</td>
<td>See Knowledge in Section 7.3.3.</td>
</tr>
<tr>
<td></td>
<td>Information sharing of strategic product information.</td>
<td></td>
</tr>
</tbody>
</table>

Only one value creation function is missing when the above list is compared to the list of functions in the preliminary research framework (see Table 17). In the PLM systems context, the procurement value creation function, which includes procurement of materials, services, estates, machines, etc., and the definition of the procurement policies, may be considered business as usual. This may be why it was not mentioned in the empirical data. The empirical data related to firm infrastructure, the VAR’s network, scout, marketing signalling, and knowledge value creation functions were analyzed in another context. It was not reanalyzed in this section; only the PLM systems context-specific characteristics were derived from the preceding analysis. References are included in the Notes-column of Table 26 of the sections in which the original analyses were done.

#### 8.10 VAR has Wide Diversity of Customer Types

The most descriptive feature of customers in the PLM systems context is their diversity. There are customers from PLM mature industry sectors, but there are
also customers from PLM immature sectors. A customer can be a large companies but also a SME company. Even inside a mature industrial sector there may be both mature and immature customers at the same time. Customers from the public sector are not that common. Their regulatory-restricted offer process requires special competence and extra resources.

The banking and finance sector is seen as immature in the PLM systems market. The construction industry in Finland, as well as in other Nordic countries, is an almost untouched market. There are possibilities for improving the efficiency of the whole network of the construction industry by using PLM systems more effectively and more widely. The high technology and electronics and machinery industries are rated as PLM mature industries, but the F&B and software industries are seen to be at the early stage of their PLM journey.

Large companies have used PLM systems for years, but SME companies are only now about to start realizing the potential of PLM systems. Small customers seek standard solutions that have the best possible fit with their business requirements because they do not have a specialized IT organization or have a very small organization but use several systems that need maintenance.

Inside immature PLM industrial sectors, companies have recognized the need for PLM systems and PLM thinking, but only a few pioneering companies have actually started implementing PLM thinking and systems into their companies. These pioneering companies face conflicts between an industry-specific traditional way of doing things and the new PLM way of doing things. A characteristic of the PLM systems context is that the commonly accepted way of working in an industry may be new and revolutionary in another industry. Company management may see the PLM as a risk to company business and their support may therefore be categorized as more cautious than full acceptance. The company that is the first to implement a PLM system sets an example for other companies in the industry and lowers barriers for others to start their own PLM initiative.

Fig. 14 summarizes the preceding cross-unit analysis of customer types in the PLM systems context.
Fig. 14. Customer types in the PLM systems context.
Only customers were considered a business actor in the preliminary research framework (see Fig. 9). But in the revised model of VAR value creation in the PLM systems context (see Fig. 16), according to the empirical data cross-unit analysis findings, the term ‘Customer Type’ is used to refer to the main internal business actor type of customers; there are several sub types (see Fig. 14).

8.11 Cost Savings, Customer Value Creation, and Competitive Edge are Main Customer Business Goals

Sometimes customer business goals at the beginning of a PLM initiative are too challenging and must be adjusted during the initiative. But the customer might still be happy with what was received and achieved. The need for organizational change management, which is related to organization adaptation, is one topic that is underestimated as a business goal. The other topic is data migration. Data migration defines what data from the old legacy system will be transferred into the new system, and how. The workload and time required for data collection from fragmented legacy systems, data clean-up, and checking is underestimated. Money is always a limitation. Changes in the customer’s market may reduce or even cancel the budget totally. On the other hand, a customer’s strong market position may lead company management to feel that the PLM initiative will be an enabler for keeping and improving the company’s position in the market, and suddenly the budget of a PLM initiative may seem to be limitless.

From the operational benefits, business information traceability, one truth of product information, and secured data quality between internal and external ESs improve quality. Unnecessary and duplicated work reduction and supplier originated data management create cost reductions. Product development process management, product data management, and internal and external ES integrations reduce cycle times. Operational benefits can be achieved through customer service improvements, which are enabled by valid product information. Business information traceability reduces information search time, which improves organization productivity. Automated and bidirectional information transfer through internal and external ES integrations also improves productivity.

Process metrics management and implementation is a managerial benefit that improves company performance. From a strategic point of view, the customer’s own value creation ability, competitive edge creation, and support of company mergers promote business growth. PLM systems are rich in features and offer the
possibility for business innovation. Bidirectional collaboration supports business alliances.

A PLM system platform simplifies company IT architecture by replacing legacy systems, leading to cost savings and improvements in the ability of IT systems to face future business challenges. The PLM system makes employee-specific silent information visible to other employees, forcing changes to work patterns.

Table 27 summarizes the cross-unit analysis of customer business goals in the PLM systems context. The category names of the business goal dimensions and types are from the preliminary research framework (see Section 5.4.1 and Table 3). The table lists the business goals in the PLM systems context identified during the within-unit analysis (see Section 7.4.1). Each business goal is categorized according to type and dimension.

Table 27. Customer business goals in the PLM systems context.

<table>
<thead>
<tr>
<th>Business Goal</th>
<th>Dimension</th>
<th>Definition in the PLM Systems Context</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational benefits</td>
<td>Business information traceability</td>
<td>One truth to product information</td>
<td>Quality improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Secured data quality between internal and external ES</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unnecessary and duplicated work reduction</td>
<td>Cost reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplier originated data management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product development process management</td>
<td>Cycle time reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product data management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal and external ES integrations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improved post-marketing and service functions</td>
<td>Customer service improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced information search time</td>
<td>Productivity improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automated, bidirectional information transfer</td>
<td></td>
</tr>
<tr>
<td>Managerial benefits</td>
<td>Process metrics management and implementation</td>
<td></td>
<td>Performance improvement</td>
</tr>
<tr>
<td>Strategic benefits</td>
<td>Customer value creation</td>
<td></td>
<td>Support for business growth</td>
</tr>
<tr>
<td></td>
<td>Competitive edge</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Company merger</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feature-rich PLM system</td>
<td></td>
<td>Business innovation</td>
</tr>
<tr>
<td></td>
<td>Bidirectional collaboration with suppliers</td>
<td></td>
<td>Support for business alliances</td>
</tr>
<tr>
<td>IT Infrastructure benefits</td>
<td>Simplified IT architecture</td>
<td></td>
<td>IT cost reduction</td>
</tr>
</tbody>
</table>
8.12 VAR Offering is Customer-Type Specific

A VAR’s product and service offering is customer-type specific. It may offer only services to certain customers. Other customers require an entire solution offering including system and services. At times, only the VAR’s own product may satisfy some customer requirements. Customers see three sectors in a VAR’s offering: reselling PLM vendor products, selling a VAR’s own products, and selling a VAR’s own service products.

A VAR offering is dependent on the PLM maturity of the focal industrial sector and the PLM maturity of the focal customer. Size of a customer is an important factor when selecting a feasible offering. Merely offering a PLM vendor’s product might be quite expensive for small companies. A small customer values fast implementation and a standard product with minimal configuration requirements.

A customer requires a VAR’s service offering to be complete and presented in a professional manner. Incompleteness and unprofessionalism are considered signs of a VAR’s small size. In this context, completeness means that the customer receives a thorough understanding of what will actually be received and at what price.

Over time, a customer that is large enough to have its own IT department can develop knowledge on how to configure the PLM system platform or develop add-ons for it. This leads to the situation where customers expect a VAR to be one step ahead of them in its product and, especially, its service offering.

8.13 VAR-Customer Business Relationship is Cyclic and Has Lifecycle

The VAR-customer business relationship has a lifecycle. The value creation in each lifecycle stage is different. A relationship is established during the sales phase when the customer identifies a need that can be solved by a PLM system,
but there is a pre-sales phase during which the VAR tries to wake-up a customer’s interest through marketing activities. If the relationship develops further during the tendering phase, the VAR proposes a set of products and services that it will offer to a customer. If the customer accepts the offer, the relationship moves to the implementation phase during which the VAR delivers the products and services to the customer. When the delivery is completed and the customer is using the system in its daily operations, the relationship is in the use phase.

A VAR-customer business relationship can be put on hold. During the pre-sales, sales, and tendering stages, a relationship can be put on hold if a customer selects another company as a supplier. The reason for moving from the use stage to being on hold is usually because the customer replaces the existing system with another system. There was no evidence in the empirical data that a relationship had gone from the implementation stage to the on hold stage. Fig. 15 aggregates the lifecycle of a VAR-customer business relationship in the PLM systems context.

Customer satisfaction is highly dependent on a VAR’s ability and willingness to respond quickly to customer feedback. Even if there are conflicts in a business relationship, the VAR and its representatives should have the energy to be flexible and do their best on behalf of a customer to help achieve success.

A product maintenance agreement creates continuity in the VAR-customer relationship. There is still an open question among VARs about what happens in the business relationship with the customers after the use phase is reached. How does the VAR move from the use phase back to the sales or tendering phase, and after that to the implementation phase again with new products and services? And, how does the VAR prevent the business relationship being put on hold? An informant was of the opinion that the VAR-customer business relationship has three-year cycles. Every three years customers become active and the relationship

Fig. 15. VAR-customer business relationship lifecycle in the PLM systems context.
returns naturally to the tendering phase and moves forward to the implementation phase and back to the use phase.

8.14 VAR-Customer Value is Strategic, Financial, and Knowledge in Nature

The VAR-customer value consists of VAR-created value (see VAR-Created Value in Section 5.4.3), VAR-perceived value (see VAR-Perceived Value in Section 5.4.3), and VAR-customer business relationship value (see VAR-Customer Business Relationship Value in Section 5.4.4). Although the scope of the research at hand is VAR value creation, the VAR-perceived value is included in the analysis because it is the prerequisite for the VAR’s existence.

8.14.1 VAR-Created Value is Time and Cost Savings through Process and Knowledge Improvements

The following sections discuss the findings of the cross-unit analysis concerning the VAR-created value sources in the PLM systems context. They were originally identified during the within-unit analysis of the empirical data (see VAR-Created Value in Section 7.4.3). The headers of the sections are from the preliminary research framework (see VAR-Created Value in Section 5.4.3 and Table 5). Although the VAR creates value for its customers at every stage of the business relationship (see Fig. 15), the value creation is relationship- and lifecycle-stage specific. For this reason, the relationship aspect has been added as part of the analysis.

Desired Product Attributes and Attribute Performance

A VAR creates value for its customers through its product offering. Products create VC by enabling new product launches faster than previously possible because the development process lead-time is shorter. Product collaboration features enable task assignments, information sharing about task accomplishments, and task progress follow-up. The preceding values are all valid at the use stage of the VAR-customer business relationship. Especially during the pre-sales and sales stages of the business relationship, but also during other stages, a VAR can develop customer knowledge through its service products.
**Desired Consequences in Use Situation**

Use of a VAR’s SW product collaboration capability eases and secures communication between the parties during the use stage of a VAR-customer business relationship. At all lifecycle stages of the relationship, a VAR can help a customer initiate its business process improvements through business process focused services, e.g. through regular operational and system reviews.

**Customer’s Goals and Purposes**

At all stages of the VAR-customer business relationship, customers perceive value when a VAR is a local actor; the VAR knows the history of the customer, where its real roots are, and which challenges it has faced during its business journey to the present day. Localized services ease the adoption of the system. A VAR’s cooperation with other members of the customer’s delivery network enable the creation of a common offering for the customer, which is more consistent and cost-efficient than merely providing a VAR-specific offering. The value creation is visible at all lifecycle stages of the relationship.

Use of a VAR’s SW product improves the customer’s image among its customers, especially if the customer is a pioneer company. Usage value comes in the form of cost and time savings. Sometimes it may come from surprising sources, such as reduced time needed for achieving information or savings in printing, since paper copies of customer reports are replaced by electronic reports. The customer is able to improve its quality by putting pressure on its suppliers to use a similar system or at least require them to deliver their information as if they had the same type of system.

Through a VAR’s ability to share industry best practices, a customer receives information on how other companies inside its industrial sector have solved similar types of problems and it can then make its decisions accordingly. Best practices from other industrial sectors are worthwhile, especially during stages prior to the use stage of the business relationship. A VAR’s special knowledge and know-how completes a customer’s own knowledge at all stages of the relationship.

How improved and suitable a VAR’s offering is comes as a result of the VAR’s responsiveness to customer ideas and feedback received during the use
stage of the relationship. It is even better if the improvement originally comes from the PLM vendor’s offering.

Table 28 summarizes the cross-unit analysis of the VAR-created value in the PL systems context. It lists the value sources in the PLM systems context identified during the within-unit analysis (see VAR-Created Value in Section 7.4.3). The value sources are categorized according to the customer value hierarchy model (see Table 5), which is part of the VAR-created value definition in the preliminary research framework (see VAR-Created Value in Section 5.4.3). The table lists information as to which lifecycle stage of the VAR-customer business relationship (see Fig. 15) the value is typically created in the PLM systems context.

**Table 28. VAR-created value in the PLM systems context.**

<table>
<thead>
<tr>
<th>Desired Customer</th>
<th>In the PLM Systems Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Value Source</td>
</tr>
<tr>
<td>Desired product attributes and attribute performance</td>
<td>SW Product</td>
</tr>
<tr>
<td>Desired consequences in use situation</td>
<td>Service product</td>
</tr>
<tr>
<td>Customer’s goals and purposes</td>
<td>SW Product</td>
</tr>
<tr>
<td>Service product Information sharing</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Knowledge Closeness</td>
<td>Localized services ease system adoption</td>
</tr>
<tr>
<td>Communication and feedback channel</td>
<td>Improved and more suitable product features based on customer ideas and feedback</td>
</tr>
</tbody>
</table>
Customer perceived value is related to time and cost savings in their daily business, but also in their PLM initiative. It is related to information sharing and knowledge building. It is also related to customer brand building and shortened lead times related to customer competitiveness.

8.14.2 VAR-Perceived Value Corresponds to Company Performance and Know-How

Like VAR value creation, VAR value perception occurs at all stages of the VAR-customer business relationship. But the type of value perception is not dependent on the relationship lifecycle stage.

To secure company performance and to be seen as a notable business actor in the PLM systems context, a VAR needs a certain number of customers. To access new markets and new customers, a VAR needs customer references that have special importance when doing business inside an immature PLM industrial sector. An existing customer can even act as a facilitator in creating a business relationship between a VAR and new customer. A VAR perceives value only when it is able to say that a certain large, global, well-known company is its customer because it has a snowball effect: more companies from the same industrial sector will do business with the VAR.

A VAR receives technological- and industry-specific know-how and creative ideas because each customer case is a two-way learning process that results in an opportunity for a VAR to develop its delivery processes and its own products, to grow its expertise about its customers’ industrial sectors, and to learn how to make the business smarter. Gaining critical market information is a result of the learning process. A VAR has an opportunity to lower its production costs by generalizing and productizing something that was originally developed for a specific customer, into a product or service that fits a large group of customers. In a sense, it can reuse the knowledge and experience that the VAR’s employees
have collected from one customer case in another customer case, and this also lowers production costs.

The list below aggregates the preceding cross-unit analysis of the VAR-perceived value in the PLM systems context. The value a VAR perceives from its customers is related to:

- Company performance,
- Technological know-how and creative ideas,
- Gaining access to new markets,
- Gaining critical market information,
- Lowering production costs, and
- Relationship of trust with customers.

The preceding list is consistent with the VAR-perceived value list in the preliminary research framework (see VAR-Perceived Value in Section 5.4.3).

### 8.14.3 VAR-Customer Business Relationship Value is Financial and Strategic in Nature

A VAR-customer business relationship has a lifecycle. Value creation is lifecycle-stage specific. A VAR-customer business relationship creates strategic and financial value for a VAR by creating stability for a VAR’s business, especially if the relationship is continuously active. A business relationship may create strategic value for the VAR even if the relationship is put on hold after the pre-sales, sales, or tendering stage if the VAR has a good reputation.

The business relationship creates strategic and knowledge value for both parties. In an advanced and well-functioning business relationship, the customer and VAR can create, develop, and improve a VAR’s product in cooperation. For a customer, a business relationship can act as a gate to a network where the customer can share its experience with peers in the same situation. The preceding topics are consistent with the VAR-customer business relationship value list in the preliminary research framework (see VAR-Customer Business Relationship Value in Section 5.4.4).
8.15 Revised Model of VAR Value Creation in the PLM Systems Context

The PLM systems context is a challenging environment and it is expected to be even more challenging in the future. It is a global market that is under continuous change. The product offering is wide, but there is also large variation in customer requirements. The PLM system platforms more or less all offer the same functionality. The competitive edge of PLM vendors and VARs is in the soft values and services.

Supply and delivery networks exist in the PLM systems context as was expected in the preliminary research framework (see Fig. 9). A PLM vendor selects the companies to act as VARs for its products. It means that each VAR has its own supply network of which the PLM vendor is a member. A VAR selects the other members of network. The customer selects the members of the delivery network, of which the VAR is a member. Customers require cooperation between the network members, sometimes even between rival companies.

Context elements that are influential within the PLM systems context are global economic conditions, legislation, industry-sector-specific working practices, and public bodies, all of which have been added into the revised model (see Fig. 16). The global economic conditions affect the PLM systems context in the same way as any other SW product context is affected. Legislation both limits and creates business opportunities for PLM vendors, suppliers, and VARs. Public bodies such as universities are partners and sources for employees. Industrial-specific working practices create business possibilities for PLM vendors, suppliers, and VARs. Context elements that affect the environment outside the PLM systems context are public bodies and industry-sector-specific working practices. Public bodies like industrial interest groups can be used to leverage PLM knowledge. A pioneering company that implements PLM may change the working practices of an entire industrial sector.

When viewed from the supplier offering point of view, there are two main supplier types in the PLM systems context. The PLM vendor provides the PLM system platform. Suppliers provide different types of services and, in some cases, products. The offering based categorization can be continued, which leads to supplier sub-types, e.g. product supplier or peer supplier (see Table 19). In the preliminary research framework (see Fig. 9), the presumption was that there was only one common supplier type. It is now acknowledged that there are two
supplier types, the PLM vendor and suppliers with supplier sub-types. These are presented in the revised research framework (see Fig. 16). The division applies further to other suppliers related research framework elements such as business relationship, supplier business goals, etc. Discussions about the similarities and differences between the supplier types are noted in the analysis sections (see Section 7.2 and 8.1).

As with suppliers, there are also different types of VARs in the PLM systems context. Again, the categorization is based on a VAR’s offering. The types are software reseller, service organization, product organization, and a hybrid organization. The latter is from the value creation strategy and business model point of view the most challenging type (see Section 8.6). The presumption of the preliminary research framework (see Fig. 9) was that only one VAR type existed. That part of the research framework is modified according to the results of the analysis. The VAR type is added as one element of the framework. Discussions about the other VAR related framework elements are noted in the analysis sections (see Sections 8.7, 8.8 and 8.9).

As with suppliers and VARs, customers can also be categorized into types within the PLM systems context. Customer categorization is based first on PLM maturity of the industrial sector, then on company size, and lastly on the PLM maturity of the customer (see Section 8.10). The preliminary research framework assumed that there was only one customer type (see Fig. 9). The revised model includes the various customer types according to the results of the analysis.

In the preliminary research framework, the assumption was that the business relationship between a VAR and supplier was a supplier-intermediary relationship that was largely determined by the sustainability of the partnership. But according to the analysis, the VAR-PLM vendor business relationship is an unequal relationship. It is a relationship that is regulated by the business agreement between the parties. For this reason, the relationship lifecycle defined in the preliminary research framework (see Section 5.3.4) applies to the relationship.

The business relationship between a VAR and suppliers has more variation because suppliers are not uniform entities. There are various types of suppliers, each with a specific offering. Therefore, the business relationships are also supplier-type specific. According to analysis, VARs and suppliers do not have governance models based on business agreements as a VAR and PLM vendor do. This makes the relationship more unstable than the corresponding relationship with a PLM vendor. The lifecycle stage of a VAR-customer business relationship impacts both preceding relationships because the VAR offering to customers is
relationship-lifecycle specific. The relationship lines in the revised framework have been revised to highlight the result of the preceding analysis.

A VAR-customer business relationship was originally characterized as continuous and rather stable but complex in the preliminary research framework. It has the same lifecycle stages as the VAR-supplier business relationship (see Section 5.4.4). According to the analysis, success of a VAR-customer business relationship can be characterized in accordance with a VAR’s capability and willingness to respond quickly to customer feedback as well as its ability to be flexible. Its lifecycle stages are more complex than the assumption made in the preliminary research framework. The relationship lifecycle stages form a cycle that is repeated during certain periods of time. As with the VAR-supplier business relationship, the VAR-customer business relationship has variations according to customer type. This has been taken into account in the revised framework.

The preliminary research framework assumed that VAR’s product offering is an element of the customer business actor, because according to the literature review the VAR offering is determined by the customer specific requirements. According to the analysis a VAR’s product and service offering is not only customer specific but also customer-type specific. Customer type does not solely determine the VAR offering but it is also dependent on the PLM maturity of the focal industrial sector and the PLM maturity of the focal customer. Even size of a customer has its effect on the VAR’s offering. In the revised framework the VAR offering is removed from the customer businer actor and placed as an element of its own between the VAR and the customers to highlight the influence of the customer type, PLM maturity of the focal industrial, the PLM maturity of the focal customer, and the size of the customer into the customer specific VAR offering.

Fig. 16 aggregates the preceding discussion and presents the revised model of VAR value creation in the PLM systems context.
Fig. 16. The revised model of VAR value creation in the PLM systems context.
9 Discussion

This chapter discusses the key findings of the research at hand. Section 9.1 evaluates its theoretical contribution and Section 9.2 discusses the implications of the key findings for business management.

9.1 Theoretical Implications

This section evaluates the key findings of the research at hand from a theoretical perspective. The implications of the key findings are evaluated with respect to the main theories (see Fig. 1 used when building the preliminary research framework (see Fig. 9). The main theories are the enterprise systems theory (see Chapter 2), the software ecosystems theory (see Chapter 3), the software business model theory (see Section 4.3), and the value creation theory (see Chapter 4).

The PLM systems context is a domain-specific platform system software ecosystem in the domain of PLM. The platform is the PLM system that the PLM vendor provides (see Section 9.1.1). It is a healthy software ecosystem in which context elements continuously create new business opportunities for all ecosystem members (see Section 9.1.2). In the ecosystem, a VAR is a hub with a supplier network. It actually has customer-specific instances from the supplier network (see Section 9.1.9). The delivery network is always customer specific and is managed by the customer (see Section 9.1.10).

The PLM vendor orchestrates the ecosystem. Other suppliers try to utilize the best possible way to maximize the value creation potential of the ecosystem (see Section 9.1.3). The VAR has a reseller role in the ecosystem, but it may also have other roles and this actually defines what type of value the VAR creates (see Section 9.1.4). The customers’ PLM maturity outlines the value creation potential of a VAR (see Section 9.1.5).

According to the findings of the research at hand, the importance of a VAR’s product and service offering in overall value creation increases (see Section 9.1.7). The enterprise theory lists overall enterprise system benefits (see Table 3), but according to the key findings, customers tend to emphasize operational benefits when they plan and execute their PLM initiative (see Section 9.1.6).

In the PLM systems context, the PLM vendor’s value creation strategy as well as the business agreement between the PLM vendor and VAR restricts the actual value creation strategy of a VAR (see Section 9.1.11). A VAR has more
freedom in its business model selection even when it is a continuation of a VAR type selection (see Section 9.1.12).

In the PLM systems context, VAR value creation is cooperative in the sense that it is done in cooperation with the PLM vendor, other suppliers, and customers. It is also bidirectional in nature, which means that if a VAR creates value for its customers, it perceives value in return. The value creation between a VAR and its suppliers is also bidirectional, but the supplier type has a major impact on what the actual supplier-perceived value is (see Section 9.1.14). Customer-perceived value is connected to the VAR-customer business relationship lifecycle stage and to the number of cycles the relationship has gone through (see Section 9.1.15).

All preceding findings are consistent with the model of Wikström and Normann (1994) related to a company as a knowledge system for the creation of value. In the model they define that a company, in the context of the research at hand a VAR, has a value star, which shows the different actors contributing to the value creation process. The customer has a similar value star, which one of the actors is the VAR. Wikström and Normann (1994) highlight also that the customer value creation is co-operative in nature, which also consistent with our findings.

9.1.1 PLM Systems Context is Domain-Specific Platform Software Ecosystem

From an external viewpoint, the PLM systems context can be seen as a PLM domain-specific platform software ecosystem (Bosch 2009), but it can also be seen as an ecosystem that is built around the PLM vendor that provides the PLM system platform (Jansen et al. 2009a). In any case, the PLM vendor is the keystone organization (Jansen et al. 2009a). It is up to the vendor as to which type of strategy it follows in its ecosystem. The optimal strategy would be for the vendor to select the strategy of the keystone organization so that it is responsible for the ecosystem orchestration and where it creates and shares value with the rest of the ecosystem.

The internal view of the PLM system shows that it is a global market under continuous change (Jansen et al. 2009a). Its lifecycle stage is closer to the leadership end of the spectrum than the self-renewal stage because it is not a fully mature market and because the PLM vendor encourages its VARs to work together (Moore 1993). VARs act as hubs in the ecosystem that connects the PLM vendor, other suppliers, and customers. At the same time, the VAR is a niche
player in the ecosystem thereby providing balance between the disciple strategy (Hagel et al. 2008, van den Berk et al. 2010) and the hedger strategy (Iansiti & Levien 2004b). It is fully committed to the PLM vendor’s platform, but at the same time is trying to develop something of its own on top of the platform. The health of an ecosystem in the PLM systems context is measured by its ability to increase diversity through the creation of valuable new functions or niches (Iansiti & Levien 2004a, Iansiti & Levien 2004b), or its ability to increase the number of new products or product options, technological building blocks, categories, or businesses (Iansiti & Levien 2004b). When healthy, legislation, industrial-sector-specific requirements, and even customer-specific requirements continuously create new business possibilities to all members of the ecosystem.

9.1.2 Context Elements Empower VAR’s Business Opportunities

Competition in the PLM systems context is tough. New players are still entering, making the intensity of the competition high (Porter 2008). A VAR may simultaneously have cooperative, competitive, and coopetition types of business relationships with its competitors and even its suppliers (Bengtsson & Kock 2000).

In this context, the economic conditions, even in a recessionary period, and legislation may create new business possibilities for a VAR (Porter 2008). It is just more challenging to find these new business opportunities. VARs come up against industrial-sector-specific working practices and IT systems into which they must integrate the PLM system and related processes. It may be considered as a restriction to one VAR, but it may provide a business possibility to another that can find an effective way of exploiting the opportunity.

Public bodies like industrial interest groups are bidirectional context elements. They can act as driving forces or messengers of PLM knowledge internal to the industrial sector. But the relationship management of interest groups requires a VAR’s time and resources (Kotler 1991). Universities, colleges, and other schools are also bidirectional context elements. They organize PLM related education for future employees of VARs, but again, relationship management of these factors requires an investment by VARs.
9.1.3 PLM Vendor Orchestrates, Other Suppliers are Innovative in their Business to Utilize Value Creation Potential

When assessing a VAR’s suppliers from the viewpoint of their product offering as many researchers have done (Ali-Yrkkö & Martikainen 2008, Iansiti & Richards 2006, Kontio et al. 2005, Messerschmitt & Szyperski 2003, Rönkkö et al. 2007, Warsta & Seppänen 2007), the PLM vendor that has a software product or products of its own and bases its business on selling software licenses and related services (Ali-Yrkkö & Martikainen 2008) is considered an ASD. It must take into consideration the requirements of various industrial sectors (Messerschmitt & Szyperski 2003). It can also be categorized as a platform provider (Iansiti & Richards 2006) or a solution provider (Rönkkö et al. 2007). Other suppliers can also be ASDs, but their customer focus is narrower than that of the PLM vendor’s. Their customer focus could be a specific industrial sector. A supplier may also be an ISD (Messerschmitt & Szyperski 2003), HW-D (Warsta & Seppänen 2007), an application provider (Iansiti & Richards 2006), or any of the preceding types of companies.

Messerschmitt & Szyperski (2003) and Warsta & Seppänen (2007) include consultants as a type of actor. All other preceding authors ignore a mere service provider. In the PLM systems context, there are companies that comprise an integral part of the context, but which do not have any software product of their own and instead provide various types of services to a VAR.

The supplier type of classification was created as a result of the cross-unit analysis (see Table 19) and gives a comprehensive view of the suppliers, their types, and their product offering in the PLM systems context, especially when viewing the topic from the VAR point of view. In the PLM systems context, the PLM vendor is clearly the keystone organization in its platform software ecosystem. The other suppliers of a VAR have niche roles in the ecosystem. They try to fully and innovatively utilize the value creation potential the PLM vendor provides.

9.1.4 VAR is Software Reseller with Service and Product Organization

Partnering of a PLM vendor and its VARs in the PLM systems context is common as in many other international business environments (Havila 1993, Havila et al.
The PLM vendor looks for specialists and companies that have already achieved a certain volume of business. It also requires that a VAR candidate have a profitable business, investments behind it, and skilled people. (McHugh 1999).

In the PLM systems context, a VAR may be a software reseller, service organization, product organization, or a hybrid that is a mixture of any of these types. Comparison of the VAR categorizations presented in the literature indicates several types of VARs. A VAR may add products to a software supplier’s product (Brinkkemper et al. 2009), which is what product organization in the PLM systems context does. A VAP adds services to a product (Brinkkemper et al. 2009) and is what the service organization does in the PLM systems context. A VAR may also be responsible for providing software product implementation activities (McHugh 1999) or customize computer hardware and software for individual clients or customer segments (Kotler 1997). These latter two VAR types are fulfilled by the service organization in the PLM systems context. A strategic VAR is a sales partner (Niu 2009) like the software reseller is in the PLM systems context. The box-moving VAR type is a sales distributor or sales agent (Niu 2009) and is not common in the PLM systems context.

In addition to the previous discussion, a VAR in the PLM systems context can be either regional or market focused. This focus has an influence on the VAR’s value creation strategy, business model, and value creation functions. In the PLM systems context, the most common form of VAR is the hybrid VAR that is a software reseller and has a service organization, a software reseller, or is both a service and product organization.

9.1.5 Customers – Large Variety of PLM Maturities

Customers in the PLM systems context are business-to-business customers that acquire PLM systems for their own use (Anderson & Narus 2004). In the PLM systems context, a relatively small number of PLM vendors provide high-value goods and services (Davies A 2004), but not just to a few large customers as it stated in the literature (Anderson & Narus 2004, Davies A 2004, Kotler 1997: 205). The typical feature of the PLM systems context is diversity. There are customers from PLM mature and immature industrial sectors. Within the mature industrial sector, there are both mature and immature customers. Customers are
large companies as well as SME companies. Each customer type has its own business goals and value creation expectations that a VAR attempts to fulfil.

9.1.6 Customer Business Goals have Emphasis on Operational Benefits

Customer business goals for the PLM initiative in the PLM systems context (see Table 27) seem to be in line with the overall enterprise system benefits (see Table 3). Operational benefits are emphasized, but all other benefits are also present. It may be because the PLM systems capability is focused on supporting product information management and related business processes (see Fig. 3).

9.1.7 VAR Offering is Mix of PLM Vendor’s Products, VAR’s own Products, and Services

There are three main components of a VAR’s offering: reselling PLM vendor’s products, selling the VAR’s own products, and selling the VAR’s service products (Brinkkemper et al. 2009, Kotler 1997, McHugh 1999, Niu 2009). But the precise item(s) from the offering actually presented to a customer is conditional on the customer type (see Fig. 14).

The cornerstone of a VAR offering is the PLM system platform. For a VAR, it means balancing between generic functionality and industry-specific customer requirements. Customization is an option for solving the dilemma (Kotler 1997), but customers value standardized products that have a minimum need for configuration and can be quickly implemented.

A VAR’s service offering includes consulting, customization, localization, implementation (McHugh 1999), and integration (Messerschmitt & Szyperski 2003) services related to the PLM vendor’s product. A VAR can add its own services on top of the PLM vendor’s service offering (Brinkkemper et al. 2009). A VAR can also offer various types of training (Messerschmitt & Szyperski 2003), or it can offer software applications and related hardware hosting services (McHugh 1999). Customers expect a VAR’s service product offering to be complete and that they will receive thorough understanding of what they are actually acquiring for the price they pay. They also put a high expectation on the service offering content and quality because over the course of time they learn more and more, so they expect a VAR to be one step ahead of them.
9.1.8 VAR-Supplier Business Relationship is Based on Trust and Cooperation

Although the business relationship between a VAR and PLM vendor is not a relationship between equals, its primary characteristic is trust (Håkansson & Snehota 1995) governed by a formal agreement between the parties. Other aspects of the relationship are knowledge of each other and a shared interest. The business relationship between a VAR and supplier is more equal and cooperative in nature than the VAR-PLM vendor relationship. It needs time and resources to develop. Quick wins are unlikely. (Ulaga 2003).

Although each business relationship experiences a certain amount of conflict, this has been found to keep the relationship healthy (Håkansson & Snehota 1995). It is hard for a VAR to hide such conflicts from its customers. For a VAR, it is easier to give up an unsatisfactory supplier relationship than an unsatisfactory PLM vendor relationship (Ulaga 2003) because a VAR’s business is closely connected to a PLM vendor’s business and its product and service offering.

Eggert et al. (2006) propose that the relationship lifecycle stages include a build-up phase, maturity phase, and decline phase, but the relationships are cyclical, as a relationship may experience a second growth phase. In the PLM systems context, a VAR-supplier business relationship may follow the proposed lifecycle, but the VAR-PLM vendor business relationship has only the build-up and maturity stages. If it goes into a decline state, it most likely means the end of a VAR’s business.

9.1.9 Supply Network is Network of Networks

In general, the focus of an SSN is narrower than the corresponding ecosystem (Jansen et al. 2009b). An SSN is further divided to supply and delivery parts (Brinkkemper et al. 2009). It is shown in the preliminary research framework as a supply network and a delivery network (see Fig. 9). Jansen et al. (2009b) and Brinkkemper et al. (2009) view the software ecosystem and SSN from the software vendor’s perspective. The research at hand has studied the SSN from the VAR’s point of view, which is a variation of the original model.

When viewing the supply network from the VAR’s point of view, there are actually two forms of networks. One includes all network members. The other includes only those members that are active in a focal customer case. From this point forward, the term supply network instance is used to denote the latter form...
of supply network in the context of a specific customer case. The foundational members of both forms of supply networks are a PLM vendor and a VAR. A VAR will usually have the responsibility for selecting the other members of the supply network instance from the pool of supply network members in accordance with what the focal customer case requires. Supply network instances may have ad hoc members, but they are not ad hoc supply networks (Jansen et al. 2009b).

Actually, a VAR has as many supply network instances as it has customers, which leads to the conclusion that in the PLM systems context, a supply network is a network of networks. When viewing the supply network instance from the PLM vendor standpoint, the vendor has a supply relationship with a VAR, but it does not necessarily see the whole network. In some cases, a vendor has a business relationship with a customer. The PLM vendor’s supply network is a network of its VARs.

**9.1.10 Delivery Network is Portfolio of Customer-Specific Networks**

In the PLM systems context, a VAR is the connecting node of the supply and delivery networks. From a VAR’s standpoint, the simplest form of delivery network is a channel between the VAR and customer; the most complex form is a delivery network of which a VAR is a member and other members include other suppliers of a customer and even the PLM vendor. The form of delivery network is dictated by customer type. Large PLM mature customers will prefer to have delivery networks, whereas PLM immature customers will more often have channel types of arrangements. If the scope of the interest is the PLM vendor, VAR, and customer, then based on some customer cases, especially large or strategic customer cases, a closed-triad type of delivery network can also be found (Havila et al. 2004). However, such a triad is rarely in its purest form, since there are almost always other suppliers involved.

In the PLM systems context, a PLM vendor selects the type of delivery network it will use. A VAR is part of that network if the vendor uses either indirect or direct/indirect delivery (Brinkkemper et al. 2009). But a customer makes the final decision about the form of delivery its specific delivery network. A VAR must manage a portfolio of different types of customer-specific delivery networks.
9.1.11 Value Creation Strategy is Two-Way Street for PLM Vendor and VAR

A VAR in the PLM systems context cannot define its value creation strategy merely from its own starting point. A PLM vendor influences its VAR’s value creation strategy by defining the strategy framework and it expects its VARs to work within that framework. Other suppliers are niche players in this matter.

Mere core value strategy is for a mature market. Value creation is based on improvements in cost and delivery (Möller 2006), which is too simple a strategy for this context. A more common strategy type is the value-added strategy where a VAR and customer and, in some cases a third party create value in cooperation. There is also a future-oriented value strategy where value is also created in cooperation, but is created through new products or processes, not just through features (Möller 2006). A VAR wants to be in a higher position of a customer’s value chain; it would like to form a strategic partnership with its customers.

In the PLM systems context, a VAR’s value creation strategy is not straightforward. A PLM vendor defines the strategy framework and then the VAR defines what it will add to it. To a PLM vendor, a VAR’s strategy definition is very much related to finding synergy and synchronization between the two companies. A VAR’s value creation strategy is strongly dependent on the type of VAR that a VAR wants to be. If a VAR wants to be a hybrid type (see Fig. 13), i.e., a software reseller but also has service and product organizations, it must have a solid strategy that first covers these three different types of businesses (Möller 2006).

A VAR’s value creation strategy in the PLM systems context is not overly dependent on a particular industrial sector, but it is more related to the PLM maturity of the focal industrial sector. A mature industrial sector requires more future-oriented strategy than an immature sector. Again, if a VAR is focused on both immature and mature industrial sectors, it must have a solid strategy that combines industrial-sector-specific strategies (Möller 2006).

9.1.12 Business Model is a Mix of Software Product, Software, and Service Business Models

All business model element types in the preliminary research framework (see Table 18) (Osterwalder & Pigneur 2002, Osterwalder et al. 2005) can be found from the empirical data (see Table 25), but not all building blocks are present in
the data. A VAR seems to have more freedom in its business model selection than in its value creation strategy definition. Still, the cooperation between PLM vendor and VAR has strong implications.

Again, the VAR type (see Fig. 13) defines what building blocks are included in the business model. In general, the sales cycle of a PLM system is rather long because they are relatively expensive and complex products (McHugh 1999). Value proposition highlights quality improvements, reuse, information sharing and traceability (Osterwalder et al. 2005), among other things. Product and service strategy is very much customer-oriented and cooperation is emphasized (Rajala et al. 2003). Customers come from a broad range of industrial sectors and occasionally even from the public sector (Osterwalder et al. 2005).

The delivery model relies on project deliveries. SaaS and license leasing are future possibilities. (Rajala et al. 2003). Information strategy is based on direct customer contacts. The main costs are from resource costs. The revenue model is based on license, service, and maintenance sales (Cusumano 2008), which are restricted by the PLM vendor’s pricing model.

**9.1.13 VAR’s Value Creation Functions are Cooperative and Bidirectional in Nature**

Apart from the procurement function in a VAR’s value creation functions, all other functions noted in the preliminary research framework (see Table 17) can be found within the empirical data (see Table 26). However, the emphasis will vary, according to the VAR’s business point of view. The marketing and sales value creation function is related to activities and resources that work to secure profitable customers. In the PLM systems context, it has high priority among the value creation functions because PLM systems have a long sales cycle and because all systems in the marketplace offer more or less the same functionality. Therefore, the marketing and sales function must be innovative in order to differentiate a VAR from its competitors and win customers.

The other topic emphasized in the PLM systems context is cooperation with a PLM vendor, suppliers, and even customers. This vital cooperation is more or less built into the functions. Marketing and sales are done in cooperation with the PLM vendor. The product and service development function is done in cooperation with customers, since requirements come from customers, but in some cases it is achieved in cooperation with the PLM vendor or suppliers.
The third topic, which is not necessarily related purely to the PLM systems context but is more related to the VAR type of channel, is that you cannot support certain value creation functions that create value only for customers or only for suppliers. All value creation functions create value for both suppliers and customers. It may be that some functions create more value for customers, but definitely not for customers only. This could be valued as an extension to the existing theory of value creation functions.

The human resource management value creation function is also emphasized because a VAR’s business in the PLM systems context is very much knowledge-intensive and customers highly value a VAR’s resource seniority and expertise when evaluating a VAR’s value creation potential. In the preliminary conceptual framework of the research at hand (see Fig. 9) the definition of the knowledge function (Geersbro & Vedel 2008) was relatively narrow compared to findings of the empirical data, which states that the VAR’s internal knowledge transfer should be an efficient and formal process. The view of Wikström and Normann (1994) event extents this view to a company should have a knowledge management, which consist of generative, productive, and representative knowledge processes. These processes are reciprocal and synchronous in nature. Their output is manifested in offering to the customers. To include the VAR’s internal knowledge management (Wikström & Normann 1994) into the preliminary conceptual framework would have probably resulted in more inside view of VAR’s internal knowledge processes.

As a result of cross-unit analysis, product management is included as part of the product and service development function, but it can also be considered as a value creation function of its own. In that sense, it would be an extension to the theory of value creation functions. The procurement value function is not present in the empirical data, but that does not necessarily mean that it does not exist in the PLM systems context. A more obvious reason for its absence is that informants felt it to be a normal part of business and not worth mentioning.

9.1.14 Supplier-Perceived Value is Closely Related to Supplier Type

When looking at the supplier value creation, i.e., what value a supplier creates for a VAR, the definitions of Simpson et al. (2001) and Webster (2000) cover the value creation in the PLM systems context quite well. But when viewing the value creation from the supplier type perspective (see Table 19), then supplier-type-specific value creation is a subset of the preceding concepts. A PLM
vendor’s value creation is closely related to company and product brand, PLM system platform, and additional sales channels. Supplier value creation is based on cooperation and on extended market presence.

As with supplier-created value and the supplier-perceived value, the concepts presented by Walter et al. (2001) and Webster (2000) cover value creation quite well. Again, there are supplier-type-specific differences (see Table 19) and from that perspective, supplier-type-specific value creation is a subset of the preceding concepts.

The usefulness of a business relationship is measured by cooperation and value creation (Håkansson & Snehota 1995). When viewing the results of the empirical data analysis as they relate to the VAR-supplier business relationship value (see Table 24), there are two observations worth mentioning. First, there are differences between VAR and PLM vendor relationship value creation and a VAR and supplier relationship value creation. Second, the relationship value creation is centred on strategic value, financial value, product quality, and mutual commitment to customer satisfaction. Trust between the parties exists, but it is regarded as the cornerstone for a successful relationship between the parties (McQuiston 2001). Mutual dependence most probably exists in the PLM systems context as well, since one party cannot achieve its objective without the cooperation and participation of the other party (McQuiston 2001). However, it may be too obvious, since the entire VAR business is based on cooperation, at least with the PLM vendor.

9.1.15 Customer-Perceived Value is Connected to Business Relationship Lifecycle Stage and Number of PLM Cycles

The business relationship lifecycle definition (Eggert et al. 2006) and business development process phases (van der Haar et al. 2001: 630) provide quite identical definitions for the business relationship lifecycle. But in the PLM systems context, the VAR-customer business relationship is more complex. The beginning of the relationship has three distinct stages: pre-sales, sales, and tendering. The relationship lifecycle is cyclical, which means that the relationship can move from the product use stage back to the tendering stage. Value creation is not only dependent on which stage the relationship is in, but it is also dependent on how many times the relationship has moved from the use stage back to the
tendering stage. Each cycle means that the customer has matured further in its PLM thinking and results in more mature value creation expectations.

Woodruff (1997) takes the view that customer perceived value is linked to the use phase of the product. In that sense, the customer value model in the B2B environment (van der Haar et al. 2001) is close to the PLM systems context where the customer value creation starts at a very early stage of the VAR-customer business relationship.

Both van der Haar et al. (2001) and Woodruff (1997) discuss the value a supplier’s product creates for a customer. Their models ignore the value that a VAR creates through its own information sharing abilities, its knowledge, expertise and experience, etc., all of which are important sources of customer-perceived value in the PLM systems context.

McQuiston (2001) argues that a successful business relationship requires not only good business relationships, but good personal relationships as well. According to the empirical data, the importance of a personal relationship between a VAR representative and customer representative was not that obvious, but it must exist as customers pointed out that they want the privilege of reserving certain VAR resources, even if they do not have a clear idea or vision of how such resources could be most effectively used.

9.2 Managerial Implications

This section discusses the key findings of the research at hand from the practitioners’ viewpoint. Based on the findings, a few practical proposals are outlined. Section 9.2.1 discusses the business potential of the PLM systems context. PLM systems are quite young compared to the history of ERP systems. There are still many industrial sectors in which the PLM systems are unknown. The functional scope of PLM systems is wide. All preceding topics make the PLM systems context an interesting business environment.

Although the PLM systems context is relatively new, the business environment is tough with many players in it. A player must differentiate itself from its competitors to be successful in this environment. Section 9.2.2 discusses the importance of the innovative service product development as a vehicle for a VAR to differentiate itself from its competitors.

Customers in the PLM systems context and the PLM vendor put high pressure on a VAR’s value creation ability. Successful business in this context is more about selling ideas and soft values than selling mere SW products. The
VAR’s internal knowledge development is a focal point among the VAR’s value creation functions. The role of the VAR’s human resource value creation function is discussed in Section 9.2.3.

Changes in global business and in the SW business have a general impact on the PLM systems business as on any other business. A dynamic VAR business model is featured in Section 9.2.4. According to the findings of the research at hand, a VAR can be a reseller, but it can also be a service organization, a product organization, or any combination of the preceding types. If a VAR decides to be a product organization it must manage its product development well in order to be successful in the business. Section 9.2.5 proposes an organization structure for a VAR’s sales and product development organization.

The PLM systems context is a network of networks. A VAR is a node or a hub within this context. It has relationships with its PLM vendor, its suppliers, and its customers. Each relationship has specific requirements. A successful VAR business requires that a VAR possess a certain number of profitable and active relationships with its customers. Successful and efficient relationship management is a prerequisite for success in this context. Section 9.2.6 suggests a proposal for a business relationship management model in the PLM systems context.

9.2.1 PLM Systems Context Offers Business Potential for Innovators

The PLM systems context is a global market that is subject to continuous change. Suppliers and VARs are forced to adapt to these changes as quickly as possible to survive in the market. In this context, a VAR should operate on a global basis where the cultural aspects, especially the business cultural aspects, are taken into consideration.

The economic recession, has had its influence on the PLM systems context, as it has on most other businesses, but it still may create business opportunities for VARs if their business strategy is to find areas of business or customers that are forced to change their operations model because of a change in their economic environment. However, such customers must at the same time be healthy enough to invest in new systems and services.

Legislation creates business opportunities for PLM vendors and VARs. When upcoming legislation is more complicated and more regulated, it affects potential customers of PLM systems. Constantly tightening legislation (e.g., export
restrictions, country specific package marking requirements, and environmental
and safety requirements) create operating environments customers can no longer
use manual systems. They require IT support to survive in the legislation jungle.
PLM systems can provide such support.

Cooperation with universities and other institutions of higher education is
highly recommended for VARs and PLM vendors, as well as suppliers. If students
are becoming familiar with and using certain PLM systems during their studies,
after graduation they will be ready to work for companies that use particular PLM
systems. For those companies that do not yet have a PLM system in place, these
new graduates may act as messengers, promoting such systems. Another potential
form of cooperation between universities, PLM vendors and VARs is in the area
of research, where new business processes and concepts are created for PLM
systems and services.

Industrial interest groups provide a discussion forum for their members to
share views about the future and industry-specific challenges. It is beneficial if a
VAR is able to create an open communication channel among these groups. A
VAR can use such a channel to share information about PLMs. It can also be used
to share information about a VAR’s customer successes, although pioneering
companies are especially cautious about discussing their PLM initiatives because
they want to keep any competitive edge they feel they have achieved through
these initiatives.

9.2.2 Innovative Service Product Development

Customers learn during the process of implementing PLM systems in their
organizations. Competitors easily imitate best practices and services of others.
These are all pressures that prompt a VAR to be as innovative and ahead of their
customers and competitors as possible with respect to development of products
and services. Discussion about how to organize a VAR’s product development is
presented in Section 9.2.5 and how to manage supplier business relationships in
Section 9.2.6. But there is still room for discussion about the importance of
innovative service product development in the PLM systems context.

According to literature (Markus et al. 2000b, Markus & Tanis 2000),
customers may not gain a competitive edge when implementing standard
enterprise systems like ERP and CRM because all other companies have the same
or similar systems. According to the research at hand, that is not the case in the
PLM systems context, although PLM systems are categorized as enterprise
systems. In the PLM systems context, the competitive edge is dependent on how mature the industrial sector is in relation to PLM. In addition, there is the fact that the major PLM vendors present more or less the same functionality in their PLM system platforms. For a VAR, it is hard to differentiate itself from its competitors by basing its identity on only PLM system platform functionality. An easier way to differentiate itself is to be innovative in its service product development. Customers expect to see a productized service offering from VARs. They also want to know the exact content of the service product before they make the purchase decision.

In the PLM systems context, there are several different types of suppliers that may all cooperate with the VAR. Most of the suppliers are niche players of the PLM vendor’s ecosystem. Creative cooperation with suppliers is an enabler for creating totally new service products. In this case, a supplier’s references from other business contexts are very important. One creative solution is the use of service suppliers to cover the service requirements of global customers. Suppliers can offer offshore resources. This competitiveness is based on low-cost services.

Cooperation between supplier and VAR may also create possibilities to reorganize a VAR’s internal operations so that the new way of working is cost efficient. If a supplier offers SaaS types of services that the VAR also offers to its customers as part of its own offering, the VAR can reorganize its IT server functions and use the supplier as a service provider for its own IT services.

Supplier business relationship management (see Section 9.2.6) enables innovative service development. It is not likely that a VAR on its own can develop something that is totally new, something that is difficult, or takes a long time to successfully imitate.

There is also the opposite view of service product development, which is that if a VAR has a productized service offering, it can service only those customers whose requirements the VAR’s service offering fulfils. This leads to the conclusion that a VAR must productize a certain portion, preferably the sizeable part, of its service offering and the rest should be customer specific.

9.2.3 Knowledge Development and Sharing Focused Human Resource Management

A VAR’s human resource management value function experiences high pressure from both the PLM vendor and customer. The PLM vendor expects that the
VAR’s personnel will have high-level knowledge about a vendor’s products. The PLM vendor offers training and a certain level of support to its VARs with regard to its products. If a VAR is a representative of a vendor’s full portfolio, the amount of required skills is quite high. It is not sufficient that the personnel or a portion of the personnel master the product features; they must master the architectural and technical aspects as well as the configuration or even customization alternatives. The preceding requirements exert high pressure not only on the PLM vendor’s training offering, but also on the VAR internal human resource management function.

Customers expect that a VAR be the master of a PLM vendor’s product and service offering. They also expect that a VAR will have a thorough knowledge about the customer’s industrial sector-specific business practices. In addition, they expect that a VAR is capable of presenting best practices from other industrial sectors that share similarities with the focal industrial sector. Customers expect that the VAR’s personnel will be quite senior in their experience and knowledge level. They expect that there will be no variation in seniority or knowledge level between the VAR’s sites when the VAR has a multi-site organization. Customers do not want to run up against any disruption in information sharing between the VAR’s personnel. They expect that information sharing will happen behind the scenes.

A customer’s own knowledge grows as they move through the PLM cycles. It forces a VAR to be at least one step ahead of its customers. This requires that a VAR has a well-structured internal training program for its personnel. It also requires that customer case-specific information sharing is well organized. The business relationship governance model discussed in Section 9.2.6 is a possible solution for information sharing. Information sharing inside a business relationship is not enough. To meet the cross-industrial-sector best business practices, sharing the information should occur across business relationships as well.

Section 9.2.1 discusses the cooperation between VARs and universities, other higher education institutions, and industrial interest groups. The cooperation enables VARs to have their finger on the pulse of the latest academic knowledge and industrial sector emphasis. A VAR should establish a solid process for supporting its personnel’s postgraduate studies. A VAR always has the opportunity to compensate for any lack of knowledge by cooperating with its suppliers. This requires a long-term and mutually planned cooperation.
9.2.4 A Dynamic VAR Business Model

By definition, a business model is a conceptual and architectural implementation of a business strategy. Although in principle, a PLM vendor defines the value creation strategy framework for the VAR’s strategy, still a VAR has alternatives from where to select its customer-perceived value creation strategy. A VAR’s value creation strategy is dependent on which type of VAR (see Fig. 13) it wants to be.

A business model defines the target customers. In the PLM systems context, a VAR must create a multilevel definition for its target customer base. First, it must define the range of industrial sectors it wants to focus on. As a matter of fact, it seems that the industrial sector is not the major factor. It is more important to define the PLM maturity of the focal industrial sector. Then, within the industrial sector, a VAR must define whether it wants to focus on all companies, large companies, or only SME companies, bearing in mind that even if the industrial sector can be considered to be at a PLM mature stage, there might be both PLM mature and immature companies within the sector.

Value creation is highly dependent on both PLM maturity of an industry and PLM maturity of a focal company. Customer requirements change while the company moves forward in its PLM maturity. This means that a VAR’s business model must have dynamic elements that can respond to maturing customer requirements. The business model definition must also leave room for a certain amount of customer-specific flexibility.

A VAR is in a challenging position when defining its value creation strategy and its business model. The PLM vendor sets the framework for the definition. In this sense, a PLM vendor has a major responsibility when defining the value creation strategy that it wants to follow within its ecosystem. If it wants to maximize its short-term revenue generation, it will follow either a dominator strategy (Jansen et al. 2009a) or a hub landlord strategy (Iansiti & Levien 2004b) to run its ecosystem. If its target is more long-term, it follows a keystone strategy and creates and shares the value with the rest of its ecosystem (Iansiti & Levien 2004b, van den Berk et al. 2010), which is naturally reflected in the business agreements between the PLM vendor and its VARs.

According to the basic definition of VAR, it must commit to one and only one PLM vendor. It does not have any other choice. It can expand its supplier base by building its own supplier network to complement its own product and service
offering. Still, the cornerstone of the offering is the PLM vendor’s platform. A VAR can be a representative of the PLM vendor’s full portfolio, which is of course more challenging than being a representative of a partial portfolio. Being a mere reseller requires a totally different business model than being a product company that offers products that are complementary to the PLM vendor’s offering. A hybrid VAR type is of course the most challenging, no matter what combination of business models a VAR adopts.

Merely adopting one business model definition is not enough. A VAR must define its business model according to the PLM maturity of the focal industrial area and according to the PLM maturity of the focal companies. A value creation strategy statement could be more of a one-fit-to-all type, but it still must take into account the PLM-mature customer requirements, since value creation will be different from the PLM-immature customer requirements.

As these dynamic elements are always present in the PLM systems context, a VAR needs to establish a solid internal process for evaluating its value creation strategy and business model. It must be ready to react to the first indication of change among its customers and accordingly make any necessary changes to its value creation strategy and especially its business model.

9.2.5 A Three-Tier Sales and Product Development Organization Structure

If a VAR chooses to be a product company or hybrid, including a product company with an SW product, a service product, or both products of its own, it must have a product management function in place to manage development of the product(s). If the product is a product that complements the PLM vendor’s product, its development must be synchronized with the vendor’s product. Synchronization does not only refer to the compatibility requirement between the products, but it also means that the functional offering between the two products does not overlap or compete.

According to the empirical data analysis, VARs tend to either generalize the customer-case-specific features to fit a large group of customers or they try to do a sizeable portion of their R&D activities as part of their customer service projects. The product management function is first needed to coordinate the customer-specific-feature creation so that it can be integrated with the VAR’s own product with a minimum amount of extra work. The function is also needed to coordinate the development of the product and capture product requirements. It is
responsible for creating a feature roadmap, which defines the features that will be created and when they will be created. It is also responsible for defining whether the feature is created as a result of its own R&D activities or as part of the customer service project.

The product management function is also responsible for cooperation with the PLM vendor regarding architectural, technical, and compatibility topics. The function should also include the VAR’s internal competence development regarding the VAR’s own products. The product management function is needed if a VAR wants to offer pre-configured solutions that are based on the PLM vendor’s platform. The pre-configured solution is fully comparable with the VAR’s own SW or service product development.

A VAR that wants to develop its own product may need a three-tier sales and product development organization. The lowest organization level is the R&D organization, which is responsible for technology development and cooperation with the PLM vendor. Its development focus is one to three years ahead, which means that something currently under development will not be put into use for one to three years. The R&D organization delivers generic product components to the product management organization, which is the mid-level organization. It productizes the generic features to features that are ready for delivery to customers. Its development focus is within one year. The highest tier of the organization is sales and delivery, which is responsible for customer deliveries and customer-specific configurations and add-ons. Customer requirements flow from sales and delivery through product management to R&D. The R&D organization has its own resource pool, but product management and sales and delivery share a common resource pool. A common resource pool is an answer to the customer requirement of fluent information sharing and knowledge development (discussed in Section 9.2.3). Company management is responsible for orchestration of the entire organization. It is responsible for supplier and customer relationship portfolio management. The sales and delivery organization is responsible for the customer business relationship governance management. Supplier business relationship governance management may be a shared responsibility and the responsible organization is determined according to the supplier type. Fig. 17 concludes the proposal for a VAR’s sales and product development organization.
One could argue that the preceding type of organization would be too extensive for VARs, especially when most of them are SME companies. If, for example, 80% or even 60% of customer requirements could be covered by the deliverables of R&D and product management organizations, then the resource needs of the customer-specific service projects would be only a small portion compared to service projects that develop and configure everything more or less from scratch.
9.2.6 A Two-Tier Business Relationship Management Model

In the PLM systems context, a VAR is in a challenging position as its role is to be a connection node between supply and delivery networks. Managing only the most valuable, profitable, or strategic customers is not enough in this context. Changes may happen almost overnight. A strategic customer may turn into a mere head office function, or a not so profitable customer may invest heavily during an economic downturn.

A delivery network is always customer specific. There is always a customer-specific subset in the supply network. The fact that PLM systems are used in many different industrial sectors makes the situation even more challenging. To meet the challenge, a VAR in the PLM systems context should have a two-tier relationship management model. The first tier is to manage supply and delivery networks and all business relationships as portfolios. The second tier should have a relationship-specific governance model. This applies to all relationships: PLM vendor, supplier, and customer relationships.

When managing both the supplier and delivery networks and relationships as portfolios, a VAR is able to develop optimal customer and supplier portfolios that ensure stable long-term profitability. It makes it possible to allocate management time and the time of other scarce resources carefully between potential and current customers to ensure both current and future revenue creation. A VAR must have enough customers to survive because relations may be put on hold or even terminated. It must have a good process to establish new relationships to replace dead and terminated relationships.

According to the empirical data analysis, supplier relationship management is mainly customer-case driven, which means that the supplier relationship is active when a portion of a supplier’s offering is needed in the VAR’s focal customer case. When managing supplier relationships as portfolios, it is possible for a VAR to build a solid supplier base, which completes the VAR’s own offering in the best possible way. It helps keep the supplier relationship alive even if there is no current common business.

Other members of the network influence the VAR-supplier and VAR-customer business relationships. Mere relationship portfolio management may not be enough. The fact that a VAR-customer relationship tends to experience three-year cycles speaks in favour of a more structured relationship governance model,
which enables an increase in the activity level of a relationship and keeps the relationship activity level more uniform than without formal management.

Instead of having ad hoc based cooperation a VAR-customer business relationship should have a common governance model that defines cooperation, common activities, and the people who will be involved at the strategic, tactical, and operational levels. The governance model requires supporting tools, e.g., software configuration tools, to determine acceptable configurations to ease software license price burdens and agreement negotiations. A governance model commits representatives of all levels of both parties of the business relationship to involvement in the customer’s PLM initiative. Especially with large strategic customers, the PLM vendor is an integral part of the governance model. As a result of the governance model, the relationship development is more proactive than reactive. It creates continuity and trust between the parties. The prerequisite is that the governance model is mutually agreed to and is put into true operation.

The governance model for SME customers is as important as for large customers, or it may be even more important. The investment of SME customers in a PLM initiative may not generate as much revenue for a VAR as the investment of large companies, but the revenue generation may be more sustainable and long-term in nature than the revenue generation from larger companies. The relationship governance model for the SME customer may not need to be as extensive as with large customers, but it should be mutually agreed to and put into true operation.

A VAR should define the kind of template that will form the basis for customer-specific governance models, but it is expected that each model will have a customer-specific flavour to it. A governance model may include regular management meetings or it may include periodic performance reviews. In any case, the target of the relationship governance model is to maximize lifetime customer value in a relationship. It should define how to create, manage, and also conclude the relationships efficiently from strategic, tactical, organizational, and analytical perspectives. It should also define how to manage relational episodes efficiently.

A VAR should have the same type of relationship governance model for its supplier relationships as well. A governance model between the PLM vendor and VAR exists. The parties define certain activities that are regularly executed to review the status of the business relationship. The governance model is created and managed solely by the PLM vendor. The VAR should introduce the same type of governance model into the business relationship as it has with its suppliers. The
governance model does not need to be as extensive as with the PLM vendor, but there should be a formal way to regularly review the status of the relationship. Together, in conjunction with relationship portfolio management, the governance model moves the cooperation from being *ad hoc* to a long-term, future-oriented, planned, innovative and managed type of cooperation, which improves quality of customer-perceived value, builds trust between the parties, and differentiates both parties from competitors.

One may argue that this type of formal two-tier relationship management requires excessive VAR resources, especially when taking into consideration that VARs are SME companies. The claim is valid, but the argument is that small customer or supplier relationship management requires at most probably only a few hours per period (i.e., per month or per quarter). What is more challenging is that the proposed relationship management requires dedicated VAR resources and also the commitment and time of the VAR management.
10 Conclusions

The PLM systems context is a platform, but it is definitely not a burning one. To conclude, the PLM systems context is an expanding platform that offers new business opportunities for innovative business actors.

The PLM vendor is the most crucial business actor in the PLM systems context. It has the ability to either create or destroy business opportunities for its VARs. It can use its channel strategy, its product development strategy, its product-pricing model, and the business agreements with its VARs and vendor as tools to manage the business in its ecosystem.

A VAR’s supplier network defines the role of other suppliers. A VAR is a connecting node between the supplier and the customer-specific delivery network. A VAR is in a challenging position in this context. The VAR type (see Fig. 13) drives the value creation strategy, business model, and value creation function definitions of a VAR. All three elements must match the customer’s PLM maturity and the PLM maturity of the customer’s industrial sector. It leads to the situation where a VAR needs to follow several business models and value creation function set-ups to maximize value creation for its customers and its suppliers.

The customers in the PLM context put the VAR in an awkward position. They require seniority, expertise and knowledge from VAR personnel, but are not willing to pay for them. PLM-mature customers are most active in the PLM market and look for alternative services from low-cost suppliers to perform the function of a VAR.

The research at hand concludes by answering the research questions based on the findings of the research. The reliability and validity of the study are discussed. The research at hand has certain limitations. There are also certain topics that demand further investigation. The limitations of the research and suggestions about further research are discussed briefly at the end of the chapter.

10.1 Answers to Research Questions

To answer the main research questions, an answer is needed for the sub-question:

RQ1.1: What is the value a VAR creates for its customers and suppliers in the PLM systems context?

Table 28 lists the value a VAR creates for its customers. The value a customer receives is related to time and cost savings, knowledge and information sharing,
and improvement of business processes and brand and image. The customer-perceived value is not the only form of value that a VAR creates for its customers. The VAR-customer business relationship also creates value for customers. It enables a customer to form a delivery network that ensures complete customer delivery, although the delivery consists of products from several suppliers. The business relationship between a VAR and its customer may create access for a customer to a peer network.

Although the scope of the research question is the value creation from VAR to supplier, there is also a discussion about the supplier-created value (see Table 22). Table 23 summarizes the supplier-perceived value, i.e., the value a VAR creates for its suppliers. Value creation is partly supplier-type specific. The value a VAR creates for its PLM vendor is related to company performance, access to new markets, receipt of critical market information, access to third parties, relationship of trust with the customer, and easier introduction of new products. The value a VAR creates for its supplier is mainly related to company performance.

As with customers, the VAR-supplier relationship creates value. And again, the value creation is supplier-type specific. For a PLM vendor, the business relationship creates financial, strategic, and knowledge value, but the value is also related to a shared concern about profitability, mutual commitment to customer satisfaction, and product quality (see Table 24).

The first main research question of the research at hand was:

\textit{RQ1: Why does a VAR create value for its customers and suppliers in the PLM systems context?}

A VAR creates value for its customers because its product and service offering fulfills needs of customers. It has information sharing abilities and knowledge, expertise, and experience on topics of interest to customers. A VAR has the ability to act as a communication and feedback channel between its customers and the PLM vendor. It also has the ability to act as a member of a customer’s delivery network in cooperation with other suppliers. In most cases, a VAR is close to its customers geographically and culturally (see Section 8.14).

Customer-perceived value is not only the value a VAR creates for the customer, but is also the value the VAR-customer business relationship creates. The most advanced value creation happens when the business relationship is a
source for co-value creation, where something is developed that creates value for both parties (see Section 8.13).

A VAR creates value for its suppliers because it extends the supplier’s market presence, has market and customer knowledge, creates new business opportunities, and acts as a feedback loop between the supplier and customer. In addition to the preceding values, aVAR creates value for its suppliers because it has business agility, it has a product and service offering that completes the supplier’s offering, and because it can act as gateway to customers. In the most advanced cases, a VAR can be a market differentiator for a supplier. A supplier can use a VAR's customer references in its own customer cases (see Table 23).

The VAR-supplier business relationship creates value for suppliers, as it does for its customers. It is also supplier-type specific. Table 24 lists the reasons for value creation. It is connected to a VAR’s experience, knowledge, product offering, financial sustainability, and company brand.

The second main research question of the research at hand was:

**RQ2: How does a VAR create value for its customers and suppliers in the PLM systems context?**

A VAR’s value creation is connected to the VAR type (see Fig. 13). It is also connected to the VAR’s value creation strategy, which is a result of synergy and synchronization with the PLM vendor’s value creation strategy (see Section 8.9). The third dimension of how a VAR creates value is through its business model and the model elements that the VAR possesses. Table 25 lists the VAR’s business model elements in the PLM systems context. In this context, the elements are related to products and services, customer interface, infrastructure management, and financial aspects. The operational level of how a VAR creates value is the value creation functions. Table 26 lists a VAR’s value creation functions in the PLM systems context. There are only a few functions, but as a conclusion it can be argued that those functions mirror the role a VAR has within the context.

The main research questions could have been merged as one how-type of research question. The topics are intentionally kept separately because we wanted to understand why a VAR is really needed between the vendor and the customer. We wanted to give motivation and reasoning for the VAR role in the research context through this research at hand. The second research question focuses on finding answers what are the business model elements and value creation functions though which the VAR actually creates value to its customers and suppliers.
10.2 Reliability and Validity of the Research

When evaluating the quality of a case study, Yin (1994) proposes that instead of using standard validity and reliability notions, the four tests that should be used are construct validity, internal validity, external validity, and reliability. Myers (2009) proposes an even more detailed list for evaluating a research case in business management. However, he points out that quality criterion varies depending on whether the research is positivist, interpretive, or critical.

For interpretive research, the plausibility of the case is more important than its design. To ensure the plausibility of the research at hand, multiple data sources have been used. In this case, the informants were comprised of individuals from a variety of organizational roles. The informants were from case VAR companies, supplier companies, and customer companies. In addition to interviews, we used the results of customer satisfaction surveys and emails as data sources. The research process has been documented (see Section 6.3) to give a clear description of what has been done and how. (Myers 2009). In the research at hand, we use the general guidelines of Myers (2009) for evaluating a research case in business.

When evaluating a case study, the first criterion is that a case study should be interesting (Myers 2009: 83). PLM systems as a research context are interesting, in that investments in PLM software and services are expected to grow from around USD $26 billion to USD $37 billion within the next five years (Przybylinski 2011). Some of the practitioners participating in the study expected the PLM systems business to become even larger than the ERP systems business is today. Another topic that makes the PLM systems context interesting is that the PLM system platform suppliers generate a major portion of their revenue from their partner network. Dassault Systèmes is the market leader with over 20% market share. It has total revenue of almost USD $3 500 million of which almost USD $1 500 million was generated from its partners. (Przybylinski 2011). The third interesting aspect of PLM systems business is that only a minor part of a suppliers’ revenue comes from services. Dassault Systèmes’ direct revenue is around USD $2 100 million, USD $200 million coming from services. This also applies to other suppliers. Siemens PLM’s revenue is around USD $1 450 million, USD, $300 million of which came from services. PTC’s revenue is around USD $1 100 million of which only USD $300 million was from services. (Przybylinski 2011). This leaves room and opportunity for VARs to do their business.
The second evaluation criterion is that the case study must display sufficient evidence. Verbatim quotations from informants were used to bring the cases to life. The case study should be complete, which is the third evaluation criterion. We have used the evidence from the VARs, suppliers, and customer to support the research. This evidence and opinions have been both consistent and divergent. According to the fourth evaluation criterion, evidence has been included that did not support the theory proposed herein (see Fig. 9). For this reason, the preliminary research framework was revised to reflect the research findings (see Fig. 16).

The fifth criterion indicates that the case study should be written in an engaging manner and this is probably the most difficult to evaluate as it expects the researcher to demonstrate enthusiasm for the research topic. It can minimally be concluded in this instance that the researcher knows the research context and its internal meanings. The researcher has over fifteen years’ experience in the PLM systems context, working fulltime for international and global companies and taking on various roles and responsibilities in PLM related assignments, from process development to PLM systems implementation. As indicated in Section 1.1, so far the personal PLM journey of the researcher has been both challenging and interesting and is expected to continue being so. It is hoped that our peers feel that the experience and the interest has been realized in the research at hand and creative energy and enthusiasm has been demonstrated for the research topic.

The last evaluation criterion is contribution to scientific knowledge. Section 9.1 discusses the theoretical implications of the findings of the research at hand. Discussion and generalizations have been presented throughout about the theoretical implications of the basis for all four main theories (see Fig. 1) on which the preliminary (see Fig. 9) and revised research frameworks (see Fig. 16) were built.

Triangulation means looking at the same phenomenon, or research question, from more than one source of data (Denzin & Lincoln 2000). Denzin & Lincoln (2000: 391) list with reference to (Denzin 1978) four basic types of triangulation. Data triangulation involves the use of a variety of data sources in a study. In the research at hand we have used interviews, emails, and documents as the sources of research data. During the research process of the research at hand we were not able to use several different researches to fulfil the criteria of investigator triangulation. Still we were able to use several evaluators during the research process. The five informants from all informants had an opportunity to read and to give their comments about the results of the within-unit analysis. We wanted to
make sure that our interpretation of the empirical data was correct before we started the cross-unit analysis phase of our research process. Methodological triangulation would have needed more resources. To fulfill the criteria of theory triangulation we have used several theories and viewpoints when building the preliminary conceptual framework (see Fig. 9), which we used when analyzing the empirical data.

10.3 Limitations of the Research

The research at hand is context-dependent. Its context is the PLM systems context and all of the main business actors are closely connected to the context. Suppliers are either the PLM vendor or other suppliers that offer products and service connected to the vendor’s PLM system platform. VARs are VARs of the PLM vendor and customers are customers of the VARs. Closeness is important from the perspective of developing a nuanced view of reality and from the researcher’s own learning process (Flyvbjerg 2006).

A common argument regarding the case study method is that generalization of its results is limited (Yin 2003). In general generalizability refers to the degree to which the original data is a representative of a larger population (Denzin & Lincoln 2000: 786). We conducted a multi-case study, which permitted cross-unit analysis, which is a necessary feature for generalisation of theories. In the research at hand, we created a preliminary model of VAR value creation in the PLM systems context (see Fig. 9) based on existing theories (see Fig. 1). We used the model as a guideline for defining the themes of the research interviews (see Appendix 2) as well as for completing the empirical data coding in the analysis phase (see Table 30). We revised the model according to the findings of the research (see Fig. 16).

As stated earlier in the research at hand is context-dependent but it is also geographically and culturally focused to Nordic countries as the three case companies (VARs) are all coming from that geographical area. However some informants are coming from other parts of Europe and even from USA. The geographical and cultural focus of the research at hand could have been more global but limitations in time, money, and resources always exist. That is why the results reflect the context of the cases and their geographical and cultural areas and are not generalizable as such. No analysis was carried out to find out if the revised model of VAR value creation is suitable also in the other contexts. That is
why the model is not able to generalize to other context but the analysis it has been proposed as a subject for future research (see Section 10.4).

Plausibility is most important for interpretive research (Myers 2009). In the research at hand, the guidelines for use of several empirical data sources were followed to ensure the plausibility of the study. However, when viewing the topic critically, it is apparent that there is room for a greater variation in the informants selected. There are several representatives of the PLM vendor among the informants, but they were all from the same company (see Table 29). To increase the plausibility of the research at hand, interviewing people from several PLM vendors would have improved the quality of the data. To access several PLM vendors required additional time and financial resources, since all of the PLM vendors are large global companies.

Another issue that may have limited the plausibility of the research at hand was that only one representative from a large global customer company (see Table 29) was included in the research. In the PLM systems context, large companies are the pioneers of an industrial sector and set the example for smaller businesses to follow. Large companies may even require a certain level of PLM ability from their partners as a prerequisite for cooperation. Large customer companies play a big role in the PLM systems context and in that regard deserved more attention.

The last but not the least limitation of the research is that it was a private project of the researcher. There was no research group to support the work. There were two phases of the research when it would have been beneficial to have peers provide a second opinion. The first phase was building the research framework when discussion about what theories the framework should have been built on would have been helpful. The other phase was the empirical data analysis phase, when it would have been beneficial to discuss the interpretation of the empirical data with peers. However, the situation was not too dire. The supervisors of the research at hand compensated for the lack of a research group by providing support every time it was required. There was also a possibility to get comments from five informants about the results of within-unit analysis to make sure that the empirical data was understood correctly during the analysis phase.

10.4 Suggestions for Further Research

The research context of the research at hand is the PLM systems context. PLM systems are enterprise systems like ERP or CRP systems. One topic for further research could be the study of VAR’s value creation in the context of other
enterprise systems. When a company implements a PLM or an ERP system, the implementation has an impact on more or less every employee of the company. Whereas, the impact on the focal end user group of a CRP system is more limited. It would be beneficial to compare a VAR’s value creation in other contexts and try to create a VAR value creation model in the context of common enterprise systems.

According to the findings of the research at hand, VAR value creation is dependent on the VAR-customer business relationship lifecycle stage, on the PLM maturity of a customer, and also on the PLM maturity of the focal customer’s industrial sector. A topic for further research could be to study customer expectations of perceived value change when the business relationship moves from one lifecycle stage to another, and how it changes as a customer moves through its PLM cycles and evolves in its PLM maturity.

A proposal for a two-tier business relationship management model was suggested (see Section 9.2.6) as a tool for VARs to manage their supplier and delivery networks as well as their supplier and customer business relationships. If any VAR finds the management model worth implementing and adopts it in practice, a study of the effects of the model on the VAR’s value creation potential for its customers and suppliers would be of value. Another possible research topic would be the study of the business effects of the model on a VAR’s business model and value creation functions.

Also presented was a proposal for a three-tier sales and product development organization structure for VARs that are either a product company or a hybrid that was a product company with either its own SW product, service product, or both (see Section 9.2.5). In the conclusion of the section, it was argued that by implementing the proposed organization structure, a VAR could achieve substantial resource and cost savings. Again, if any VAR finds the proposed structure worth implementing and adopts it in practice, then a potential research topic would be to study the real resource and cost savings and whether the organization structure had an impact on the VAR’s potential value creation for its customers and suppliers.
References


Havila V (1993) The role of the intermediary in international business relationship. Licentiate Thesis, Uppsala University, Department of Business Studies


## Appendix 1 List of Empirical Data Sources

### Table 29. Empirical data sources.

<table>
<thead>
<tr>
<th>Date</th>
<th>Data Source Type</th>
<th>Informant's Id</th>
<th>Role</th>
<th>Company</th>
<th>Geography</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>05.12.2008</td>
<td>Preliminary interview F2F interview</td>
<td>VAR 1</td>
<td>CEO</td>
<td>Case VAR A</td>
<td>Finland</td>
<td>60 min</td>
</tr>
<tr>
<td>10.12.2008</td>
<td>Preliminary interview F2F interview</td>
<td>VAR 2</td>
<td>CEO</td>
<td>Case VAR B</td>
<td>Finland</td>
<td>54 min</td>
</tr>
<tr>
<td>2009</td>
<td>Customer survey</td>
<td></td>
<td></td>
<td>Case VAR C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Customer survey</td>
<td></td>
<td></td>
<td>Case VAR A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.02.2011</td>
<td>Research interview F2F interview</td>
<td>VAR 1</td>
<td>CEO</td>
<td>Case VAR A</td>
<td>Finland</td>
<td>60 min</td>
</tr>
<tr>
<td>08.02.2011</td>
<td>Research interview F2F group interview</td>
<td>Customer 1</td>
<td>CIO</td>
<td>Customer A</td>
<td>Finland</td>
<td>63 min</td>
</tr>
<tr>
<td>09.03.2011</td>
<td>Research interview F2F interview</td>
<td>Customer 2</td>
<td>Project manager</td>
<td>Customer B</td>
<td>Finland</td>
<td>71 min</td>
</tr>
<tr>
<td>09.03.2011</td>
<td>Research interview F2F interview</td>
<td>Customer 3</td>
<td>PLM system owner</td>
<td>Customer B</td>
<td>Finland</td>
<td>23 min</td>
</tr>
<tr>
<td>10.03.2011</td>
<td>Research interview F2F interview</td>
<td>Customer 4</td>
<td>End user</td>
<td>Customer B</td>
<td>Finland</td>
<td>44 min</td>
</tr>
<tr>
<td>15.03.2011</td>
<td>Research interview F2F interview</td>
<td>Customer 5</td>
<td>Quality &amp; IT manager</td>
<td>Customer C</td>
<td>Finland</td>
<td>49 min</td>
</tr>
<tr>
<td>15.03.2011</td>
<td>Research interview F2F interview</td>
<td>Customer 6</td>
<td>Supplier manager</td>
<td>Customer D</td>
<td>Finland</td>
<td>50 min</td>
</tr>
<tr>
<td>23.03.2011</td>
<td>Email</td>
<td>VAR 2</td>
<td>CEO</td>
<td>Case VAR B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.03.2011</td>
<td>Research interview F2F interview</td>
<td>Customer 7</td>
<td>End user</td>
<td>Customer D</td>
<td>Finland</td>
<td>32 min</td>
</tr>
<tr>
<td>05.04.2011</td>
<td>Research interview F2F and phone interview</td>
<td>VAR 3</td>
<td>Business area director</td>
<td>Case VAR C</td>
<td>Sweden</td>
<td>65 min</td>
</tr>
<tr>
<td>06.04.2011</td>
<td>Research interview F2F interview</td>
<td>Supplier 2</td>
<td>CEO</td>
<td>Supplier B</td>
<td>Finland</td>
<td>38 min</td>
</tr>
<tr>
<td>07.04.2011</td>
<td>Research interview F2F interview</td>
<td>Customer 8</td>
<td>Head of application cluster</td>
<td>Customer E</td>
<td>Finland</td>
<td>51 min</td>
</tr>
<tr>
<td>14.04.2011</td>
<td>Research interview Phone interview</td>
<td>Supplier 3</td>
<td>CEO</td>
<td>Supplier B</td>
<td>Germany</td>
<td>29 min</td>
</tr>
<tr>
<td>Date</td>
<td>Data Source Type</td>
<td>Informant's Id</td>
<td>Role</td>
<td>Company</td>
<td>Geography</td>
<td>Duration</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>----------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>18.04.2011</td>
<td>Research interview Phone interview</td>
<td>VAR 4</td>
<td>Business area manager</td>
<td>Case VAR C</td>
<td>Sweden</td>
<td>71 min</td>
</tr>
<tr>
<td>20.04.2011</td>
<td>Research interview Phone interview</td>
<td>Supplier 4</td>
<td>CEO</td>
<td>Supplier D</td>
<td>USA</td>
<td>46 min</td>
</tr>
<tr>
<td>28.04.2011</td>
<td>Research interview F2F interview</td>
<td>VAR 5</td>
<td>Sales director</td>
<td>Case VAR C</td>
<td>Finland</td>
<td>67 min</td>
</tr>
<tr>
<td>03.05.2011</td>
<td>Research interview F2F interview</td>
<td>Supplier 5</td>
<td>Vice President</td>
<td>Supplier E</td>
<td>Finland</td>
<td>55 min</td>
</tr>
<tr>
<td>16.05.2011</td>
<td>Research interview Phone interview</td>
<td>Supplier 6</td>
<td>Director</td>
<td>Supplier E</td>
<td>Sweden</td>
<td>51 min</td>
</tr>
</tbody>
</table>
Appendix 2 Themes of the Research Interviews

List of original themes for the research interviews:
- PLM systems context
- Context elements
- Supply network
- Delivery network
- Supplier
  - Supplier business goals
  - Supplier offering
  - Supplier VAR value
- VAR-supplier business relationship
- VAR
  - Value creation strategy
  - VAR business model
  - Value creation functions
- Customer
  - Customer business goals
  - VAR offering
  - VAR customer value
- VAR-customer business relationship

List of themes for the VAR unit research interviews:
- PLM systems context
- Context elements
- Supply network
- Delivery network
- VAR value creation strategy
- VAR business model
- VAR value creation functions
- VAR’s offering\(^{12}\)

\(^{12}\) VAR’s offering means product and service offering to focal VAR’s customers.
- VAR’s suppliers
- VAR-supplier business relationship\(^{13}\)
- Supplier offering\(^{14}\)
- VAR-supplier value\(^{15}\)
- VAR’s customers
- VAR-customer business relationship\(^{16}\)
- VAR-customer value\(^{17}\)

List of themes for the Supplier unit research interviews:
- PLM systems context
- Context elements
- Supply network
- Supplier business goals
- Supplier offering\(^{18}\)
- Supplier’s VARs
- VAR-supplier business relationship\(^{19}\)
- VAR-supplier value\(^{20}\)

\(^{13}\) The theme of VAR-supplier business relationship was discussed based on the list of VAR’s suppliers on a supplier-by-supplier basis.

\(^{14}\) The theme of Supplier offering was discussed based on the list of VAR’s suppliers on a supplier-by-supplier basis. Supplier offering means product and service offering to focal VAR.

\(^{15}\) The theme of VAR-supplier value was discussed based on the list of VAR’s suppliers on a supplier-by-supplier basis. There was a separate discussion about the value the VAR creates for its suppliers, about the value suppliers create for the VAR, and about the value the VAR-supplier business relationships create for the VAR.

\(^{16}\) The theme of VAR-customer business relationship was discussed based on the list of VAR’s customers on a customer-by-customer basis.

\(^{17}\) The theme of VAR-customer value was discussed based on the list of VAR’s customers on a customer-by-customer basis. There was a separate discussion about the value the VAR creates for its customers, about the value customers create for the VAR, and about the value the VAR-customer business relationships create for the VAR.

\(^{18}\) The theme Supplier offering means product and service offering, especially to the VAR but also in general product and service offering toward all VARs.

\(^{19}\) The focal VAR in the discussion about the theme Supplier-VAR business relationship is the VAR. There was also a separate discussion about the topic in general, i.e., all VARs of the supplier.

\(^{20}\) The focal VAR in the discussion about the theme Supplier-VAR value was the VAR. There was a separate discussion about the value the supplier creates for the focal VAR, about the value the focal VAR creates for the supplier, and about the value the supplier-VAR business relationship creates for the supplier. There was also a separate discussion about these topics in general, i.e., all VARs of the supplier.
The list of themes for Customer unit research interviews:

- PLM systems context
- Context elements
- Delivery network
- Customer business goals
- VAR’s offering\(^{24}\)
- Customer-VAR business relationship\(^{24}\)
- Customer-VAR value\(^{26}\)
- VAR value creation strategy\(^{27}\)
- VAR business model\(^{28}\)
- VAR value creation functions\(^{29}\)

\(^{21}\) The theme VAR value creation strategy means how the supplier sees the focal VAR’s value creation strategy.

\(^{22}\) The theme VAR business model means how the supplier sees the focal VAR’s business model.

\(^{23}\) The theme VAR value creation functions means how the supplier sees the focal VAR’s value creation functions.

\(^{24}\) Focal VAR in this case is the VAR, whose customer the customer was.

\(^{25}\) The focal VAR in the discussion about the theme Customer-VAR business relationship was the VAR.

\(^{26}\) The focal VAR in the discussion about the theme Customer-VAR value was the VAR. There was a separate discussion about the value the customer creates for the focal VAR, about the value the focal VAR creates for the customer, and about the value the customer-VAR business relationship creates for the customer.

\(^{27}\) The theme VAR value creation strategy means how the customer sees the focal VAR’s value creation strategy.

\(^{28}\) The theme VAR business model means how the customer sees the focal VAR’s business model.

\(^{29}\) The theme VAR value creation functions means how the customer sees the focal VAR’s value creation functions.
Appendix 3 List of Codes Used in Classifying and Analyzing the Empirical Data

The initial data-coding scheme included the codes of node tree and coding child level 1. The initial data-coding scheme was created based on the preliminary research framework (see Fig. 9). It was used during the first coding round of the empirical data. The coding child level 2 was added before the second coding round was started. Additional detailed codes were added to the points where it was felt they were needed for the purpose of further analysis.

Table 30. List of codes used in classifying and analyzing the empirical data.

<table>
<thead>
<tr>
<th>Node Tree</th>
<th>Coding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level 1</td>
<td>Level 2</td>
</tr>
<tr>
<td>PLM systems context</td>
<td>See Section 5.1.</td>
<td></td>
</tr>
<tr>
<td>Supply network</td>
<td>See Section 5.1.1.</td>
<td></td>
</tr>
<tr>
<td>Delivery network</td>
<td>See Section 5.1.1.</td>
<td></td>
</tr>
<tr>
<td>Context elements</td>
<td>See Section 5.1.2</td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td>See Section 5.2</td>
<td></td>
</tr>
<tr>
<td>Supplier business goals</td>
<td>See Section 5.2.1</td>
<td></td>
</tr>
<tr>
<td>Supplier offering</td>
<td>See Section 5.2.2</td>
<td></td>
</tr>
<tr>
<td>VAR-supplier value</td>
<td>See Section 5.2.3</td>
<td>Supplier-created value in Section 5.2.3</td>
</tr>
<tr>
<td>Supplier-perceived value</td>
<td>See Supplier-Perceived Value in Section 5.2.3</td>
<td></td>
</tr>
<tr>
<td>VAR</td>
<td>See Section 5.3</td>
<td></td>
</tr>
<tr>
<td>Value creation strategy</td>
<td>See Section 5.3.1</td>
<td></td>
</tr>
<tr>
<td>Business model</td>
<td>See Section 5.3.2</td>
<td></td>
</tr>
<tr>
<td>Value creation functions</td>
<td>See Section 5.3.3</td>
<td></td>
</tr>
<tr>
<td>VAR-supplier-business</td>
<td>See Section 5.3.4</td>
<td></td>
</tr>
<tr>
<td>relationship</td>
<td>VAR-supplier business</td>
<td>See VAR-Supplier Business Relationship Value in Section 5.3.4</td>
</tr>
<tr>
<td>relationship value</td>
<td>Business Relationship</td>
<td></td>
</tr>
<tr>
<td>Customers</td>
<td>See Section 5.4</td>
<td></td>
</tr>
<tr>
<td>Customer business goals</td>
<td>See Section 5.4.1</td>
<td></td>
</tr>
<tr>
<td>VAR offering</td>
<td>See Section 5.4.2</td>
<td></td>
</tr>
<tr>
<td>VAR-customer value</td>
<td>See Section 5.4.3</td>
<td></td>
</tr>
<tr>
<td>VAR-created value</td>
<td>See VAR-Created Value in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Section 5.4.3</td>
<td></td>
</tr>
<tr>
<td>Node Tree</td>
<td>Coding</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Level 1</td>
<td>Level 2</td>
<td></td>
</tr>
<tr>
<td>VAR-perceived value</td>
<td>See VAR-Perceived Value in Section 5.4.3</td>
<td></td>
</tr>
<tr>
<td>VAR-customer business relationship</td>
<td>See Section 5.4.4</td>
<td></td>
</tr>
<tr>
<td>VAR-customer business relationship value</td>
<td>See VAR-Customer Business Relationship Value in Section 5.4.4</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 4 Short Introduction of Business Actor Companies

Case VAR A

Case VAR A is approximately equal in size to case VAR B when measured in revenue and number of employees. It was a subsidiary of a Nordic IT company. Its product and service offering is based on its PLM vendor’s product offering. It offers services for system technical setup, business value study, template implementation, training, and helpdesk services. The customers of Case VAR A are from traditional industry segments such as machinery and energy, but it also has customers from PLM immature industrial sectors.

Case VAR B

Case VAR B is a 20-year old privately owned company that has the market leading position in solutions and services within its field in Nordic countries. It develops, markets, and supports PLM solutions, which enable companies to speed up and streamline product creation and product delivery processes. VAR B offers value-adding services such as training, implementation, consulting, and support in cooperation with its partners.

   The customers of Case VAR B are mainly from electronics, automotive, metal, and product automation industries, but it also has customer references from PLM immature industrial sectors. It cooperates with several universities and research centres.

Case VAR C

Case VAR C is a supplier of PLM solutions for creating and managing product information throughout the entire product lifecycle, from product planning, development, and design to production, sales, and support. The company is almost 20 years and employs over 150 people. It is part of a consolidated corporation listed on a stock exchange. VAR C conducts business in the whole Nordic area, Europe and North America. It is a strategic partner with more than 200 industrial companies. The main customers come from the industrial
equipment, automotive, construction, energy, telecom and electronics, life sciences, fashion and consumer goods industrial sectors.

VAR C offers software and services that contribute to management of product information throughout the product lifecycle. The solutions are based on the PLM solutions from the PLM vendor. VAR C also offers solutions within CAD, technical document management, product configuration, visualization, integrations, and portals in partnership with leading suppliers in their field. VAR C’s service offering includes such services as business process review, change management, implementation, training, maintenance, and support.

Customer A

Customer A is an exchange-listed company. It employs over 1000 people in over 10 countries. It has introduced PLM systems to manage product-related data, support design processes, and to support networking of internal and external operators. Its business goal is to have effective new product launches and to provide high-quality products. At the time of the research interview, it was not a customer of any of the case VAR companies. Case VAR C delivered services to Customer A when it was in its early stage of its PLM initiative. Customer A is coming from a PLM immature industrial sector. At the time of the research interview it was in the middle of its second PLM cycle.

Customer B

Customer B is a subsidiary of a company, which is a worldwide leader in its sector. It employs over 600 people worldwide. The business goal related to its PLM initiative is to build a collaboration platform for its product-related information originating from R&D through production. It wants to boost its innovation capabilities, leading to an improved product offering. Customer B is coming from a PLM mature industrial sector. It is a PLM mature company with several years’ experience of PLM system usage. At the time of the research interview it had just completed its second PLM cycle. Customer B is a customer of Case VAR B and Case VAR C.
Customer C

Customer C is a privately owned company that employs an average of 40 people. The business goal of their PLM initiative is to protect their IP assets. Customer C is coming from a PLM mature industrial sector. It is also a PLM mature company with several years' experience of PLM system usage. At the time of the research interview it in the middle of a new PLM system implementation project. Customer C is a customer of Case VAR A.

Customer D

Customer D represents country operations of an exchange-listed company group. Customer D employs over 3300 people. Its PLM initiative business goal is to provide better transparency and improved decision-making and project control. Customer D is coming from a PLM immature industrial sector. While Customer D was going through its third PLM cycle at the time of the interview, the company is still a PLM immature company because the length of its PLM cycles has been very short. Customer D is a customer of Case VAR C.

Customer E

Customer E is a multinational, exchange-listed company. It operates in more than 150 countries worldwide and has over 70 000 employees. It has more than 1000 customers in over 150 countries. The business goal of its PLM initiative is to unify and streamline processes across the product lifecycle, and to enable the company to work easily and cost-effectively on projects. Customer E is coming from a PLM mature industrial sector and is a PLM mature company with over ten years' experience of PLM system usage. It is a customer of all three case VAR companies.

Supplier A

Supplier A is a privately owned IT service provider that provides services to companies and communities from both the private and public sectors. It has over 700 customers. It employs around 50 people. It is a supplier to Case VAR C.
Supplier B

Supplier B is a privately owned software company that employs around 50 people. It provides services related to all aspects of the software development process, including project management, concept creation, analysis and design, development and configuration, integration, testing, support, and training. It is a supplier to Case VAR A and Case VAR C.

Supplier C

Supplier C is a company that delivers add-on solutions for the PLM vendor products as well as applications that target industry standard formats. Customer-specific solutions for CAD, PLM and neutral formats also belong to its product and service offering. It employs over 200 people and has over 2000 customers worldwide. It has its own VAR network, which has 50 sales partners. It is a supplier to Case VAR C.

Supplier D

Supplier D is a company that develops, deploys, and sustains enterprise PLM software solutions to help customers build better products. It has a 16-year track record of delivering PLM solutions worldwide. Its customers include some of the world’s largest companies in their field. It is a supplier to Case VAR C.

Supplier E

Supplier E is a company that employs over 9000 people worldwide and has over 150,000 customers of all sizes from several industrial sectors. It has a generic PLM platform in addition to several more specific platforms that all belong to the PLM domain. It is the common PLM vendor to all three case VAR companies.
<table>
<thead>
<tr>
<th>Book Order</th>
<th>Title</th>
<th>Authors</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>584</td>
<td>Academic knowledge creation as a spatio-temporal process: The case of international research groups in Finland</td>
<td>Hautala, Johanna</td>
<td>2011</td>
</tr>
<tr>
<td>585</td>
<td>Coevolution of male signals and female preferences in <em>Drosophila montana</em> and <em>D. virilis</em></td>
<td>Saarikettu-Känsälä, Mari</td>
<td>2011</td>
</tr>
<tr>
<td>586</td>
<td>Local adaptation and its genetic basis in <em>Arabidopsis lyrata</em></td>
<td>Leinonen, Päivi</td>
<td>2011</td>
</tr>
<tr>
<td>587</td>
<td>Applying usability cost-benefit analysis — explorations in commercial and open source software development contexts</td>
<td>Rajanen, Mikko</td>
<td>2011</td>
</tr>
<tr>
<td>588</td>
<td>Information technology incidents in the present information society: Viewpoints of service providers, users, and the mass media</td>
<td>Tervo, Heli</td>
<td>2011</td>
</tr>
<tr>
<td>589</td>
<td>Genetic variation and evolution among industrially important <em>Lactobacillus</em> bacteriophages</td>
<td>Riipinen, Katja-Anneli</td>
<td>2011</td>
</tr>
<tr>
<td>590</td>
<td>Populations and communities in human modified forest landscapes</td>
<td>Lampila, Petri</td>
<td>2011</td>
</tr>
<tr>
<td>591</td>
<td>Change process towards ICT supported teaching and learning</td>
<td>Liukkonen, Kari</td>
<td>2011</td>
</tr>
<tr>
<td>592</td>
<td>Cross-platform functionality in practice: Exploring the influence of system composition on user experiences of personal exercise monitoring</td>
<td>Segerståhl, Katarina</td>
<td>2011</td>
</tr>
<tr>
<td>593</td>
<td>Value creation in collaboration between software suppliers and customers: suppliers’ perspective</td>
<td>Tiikkaja, Marjo</td>
<td>2012</td>
</tr>
<tr>
<td>594</td>
<td>Liquid chromatography–mass spectrometry in drug metabolism studies</td>
<td>Rousu, Timo</td>
<td>2012</td>
</tr>
<tr>
<td>595</td>
<td>Theoretical study of the oxidation of a pure and alloyed copper surface</td>
<td>Kangas, Teija</td>
<td>2012</td>
</tr>
<tr>
<td>596</td>
<td>Seasonal variation in the life histories of a viviparous ectoparasite, the deer ked</td>
<td>Härkönen, Laura</td>
<td>2012</td>
</tr>
<tr>
<td>597</td>
<td>Reconstructing physical activity from human skeletal remains: Potentials and restrictions in the use of musculoskeletal stress markers</td>
<td>Niinimäki, Sirpa</td>
<td>2012</td>
</tr>
<tr>
<td>598</td>
<td>Measurement-based value alignment and reasoning about organizational goals and strategies: Studies with the ICT industry</td>
<td>Mandić, Vladimír</td>
<td>2012</td>
</tr>
<tr>
<td>599</td>
<td>Why information systems and software engineering students enter and leave their study programme: A factor model and process theory</td>
<td>Leiviskä, Katja</td>
<td>2012</td>
</tr>
</tbody>
</table>

**Book orders:**
Granum: Virtual book store
http://granum.uta.fi/granum/
Tuula Siira

VALUE CREATION BY ENTERPRISE SYSTEMS VALUE ADDED RESELLERS

THE CASE OF PLM SYSTEMS VARS