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BUSINESS MODEL OF BLOCKCHAIN ENABLED SMART CITY SERVICES

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This thesis is qualitative research analyzing how blockchain can influence the business models that are for smart city services. Blockchain technology is seen as an innovation that will change the functioning of city services in the future. The study designed to see the effect of the business model on implementation of blockchain enabled smart city services. This study combines the Causal Layered Analysis and Business Model Wheel to see the influence. In doing so, this study chose to understand the futures of a tech-aided social context; the blockchain enabled smart city services.

The theoretical part of this study consists of smart city services, fundamental of blockchain technology, and business model. The literature review enabled the author to collect the data efficiently. The empirical part is based on the semi-structured interviews from the professionals from city organization and researchers on the research topic area. The author provided a discussion on different business model elements for the blockchain enabled smart city sector in Finland.

This research contributes to a holistic understanding of the business model, smart city potentials and applies blockchain in a different layer of smart city services. This paper looks at the future scenarios of the business model and discusses how blockchain can make an impact. This research also combines the foresight of future city structures and business modeling at future scenarios.

This research will also help the researchers, city managers, business development professional for understanding future cities and how innovative technology make an impact on city business model. This comprehensive study also helps future business perspective for city associated organization. The outcome of the research can be used for identifying a business opportunity and to understand the influence of technology on the business model.

This study uncovers some business model elements and its effect on short, mid, and long term future. All in all, with a solid theoretical base, high-quality empirical dataset, well-argued results, and maintaining ethical standards, this study offers a comprehensive description of the studied topic.

Keywords
Smart city, Blockchain, Business Model, Future Study
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Abbreviated Terminologies:

BM – Business Model
BC – Blockchain
SC – Smart City
BMC – Business model canvas
BMW – Business model wheel
EHR – Electronic Health Records
EMR – Electronic Medical Records
ICO – Initial Coin Offering
IoT – Internet of Things
IPR – Intellectual property rights
NFC – Near field Communication
GDPR – General Data Protection Regulation
CSR – Corporate social responsibility
1 INTRODUCTION

Introducing new technologies into city services means designing a better way to serve the citizen. Blockchain technology mainly linkage with cryptocurrency, has a promising future of in the secure financial transaction, securing contracts. Tapscott & Tapscott (2016) recognize the blockchain potentials in redefining in the idea of trust in digital communities. This technology is also enhancing the transparency of city organizations among local and international institution regardless of security and privacy concern. This study will use the Business model thinking to foresee city services and how blockchain technology may influence the business model that is to be developed for smart city services. This study will look at the smart city services in different fields and try to see what impact blockchain can make in those fields and their impact. To the asses the future, the author used Causal Layered Analysis to foresee the future in multiple layers (Inayatullah 1998). This study will use the business model elements and will use the business model wheel tool to see the changes in the future (Ahokangas et al., 2014). The idea of seeing in both perspectives is objective oriented as city organizations are entire deals with the citizens, and the change of those elements will make an impact on business and city organization level.

Many city administration is recognizing the blockchain technology in their smart city initiative but implementing in all the layers require and profound study in that particular field. This study will give a comprehensive framework of the smart city services and where a citizen can interact, solve their problems quickly, and use technologies to increase efficiency. This study will open new horizons to the business researchers and city managers to see the impact of implementing the blockchain in the smart city services area.

A smart city is the concept of information and communication technologies to increase efficiency and share information with the public and private sector to improve the quality of life as well the quality of government service and citizen welfare (Chourabi, Nam, Walker, Gil-Garcia, Mellouli, Nahon, Pardo, Scholl, 2012). It is an infrastructure that supported by technology and automated information processing (Neirotti, Marco, Cagliano, Mangano, Scorrano 2014). It mainly a process of transformation from a traditional city to an ICT enable service to make the traditional city more efficient, connected and sustainable city (Chourabi, Nam, Walker, Gil-Garcia, Mellouli, Nahon,
Pardo, Scholl, 2012). This transformation requires an interactive framework based on social, economic and organizational perspective primary information and communication technology to develop and promote sustainable development practice to encounter growing urbanization challenges. This initial concept of the smart city helps to plan effective and efficient allocation of existing resources (Su, Li, Fu 2011). Based on the conceptual variations of a smart city can be simplified some keys components of smart city and categorized all those factors into category those could be technological factors, human factor and institutional factor (Nam, Pardo 2011). In this research, we divide the smart city into six features where we believe all those interconnected with one another those are smart people, smart health care, smart governance, smart mobility, smart energy, and smart environment. There have been few cities who are using some features of the smart city, Palo Alto using the adaptive signal technology to keep uninterrupted traffic service (City of Palo Alto 2013). They also introduced an application for city services accessible through a smartphone (City of Palo Alto 2013), the city of Riverside in California using tech-based transformation to improve traffic flow, electrical infrastructure (Nam & Pardo 2011).

This study identified the smart city services into six key categories and those categories divided into three levels. The first level defines keys ideas of that category than those ideas breakdown to the application and finally to activity. The first service we identified is smart healthcare within Smart city. For the smart healthcare system, the integration of health data management, communication tools including health care support, the electric ambulance is required. To manage the sensitive private information smart contract can ensure the data security and confirms that only authorized person can access the data. Smart health care analyzes the patient data which enables the physician to advise the patients’ health data and predictions (Piro, Cianci, Grieco, Boggia, & Camarda, 2014). The rise of electric and automated cars also gives the concept of an electric ambulance for emergency medical needs. The second critical smart city service is smart governance which mainly enables transparency in policy-making and ensuring open data policy and enabling e-government in the public sector (Johansson, Lassinantti & Wiberg, 2015). Smart governance engages citizen in ensuring the service and interacts using internet-based communication, and the government takes measurement steps based on the feedback. Smart governance also ensures smart safety through tracking critical situations and
enabling the smart, civil system. Smart governance also ensures smart education by connecting and cloud-based classroom.

The third crucial smart city service is smart mobility which aims to less carbon also a movement that can save time and money. This is closely related to smart vehicles which directly dependent on smart energy system (Galus, Waraich, Noembrini, Steurs, Georges, Boulouchos, & Andersson, 2012). The traditional transport is responsible for one-fourth of global carbon emission, and electric vehicle uses renewable electric to fill this gap to reduce it. Also, autonomous vehicles are more reliable than human-controlled vehicles (Miler, Ju, 2014). The part of smart mobility is to manage transport control over traffic monitoring (Lee, Park, Kim & Jeon, 2011), this real-time traffic monitoring can take preventive measure to reduce the traffic flow of one area and control over the overall traffic situation. The fourth important service element is smart energy, and the smart city aims for low-cost production, identify well eco-friendly sources and the highest utilization of that energy. The smart energy or smart grid will allow the individual customer to government level to have control over electricity consumption. Another critical aspect of smart energy is smart building as it can adapt to grids conditions and communicate with other buildings. It can store energy from the renewable sources, and smart meter can preserve the energy based on usage data, and a smart contract can distribute the excess energy (Snoonian, 2003).

The fifth important element of the smart environment as climate change, cleaner air, and proper waste management are burning issues for the last couple of decades. Now sanitation and waste management are managed by IoT-enabled vehicles for collection and removal. Already few cities have taken the initiative to collect waste and transfer to those through a suction pipe that can save time and energy. The smart environment enables to predict any weather concern based on air quality, and the city can take the data from a sensor installed in vehicles running in different areas of the city and analyze the data pattern and warn or notify citizen in advance if there any issues. Finally, smart people is the last element of smart city and city organization needs more participatory citizens and aims to improve the quality of life. The relation between city organization and citizens and city associated organizations are also optimized by proper participation from citizens. This participation requires e-education, e-business, and e-government.
Coming to the Business model, many researchers address the Business model concept for more than a couple of decades and but the concept still has research limitation which is criticized by several scientific works of literature (Zott 2011). However, this limitation and disagreement are reasonable during the development period of such concept cover such a vast area of Business gives a holistic view and have a multidisciplinary application (Zott 2011). As business model research grow during the time of the dot-com boom, the Dot Com bubble gave a thought to think more about the buzzword Business model (Amit, Zott 2001). During that time researchers tried to find out the reason why some business become successful while the rest failed (Dubosson-Torbay, Osterwalder, Pigneur, 2002) and since then the model gained interested not only in the academic research in e-business or internet based business this became more popular in the field of information system and strategic management research field. So many researchers have focused on the e-commerce based business, and some model has been focused based on the startups or small size firms. Therefore the analysis on the Business model and the related concepts on the business model have some research gaps (Pateli, Giaglis, 2004). This gives an idea of a consolidating some viewpoints of some business model concept to get the multi-perspective concept. This growing interest gave a thought a scientific foundation of the business model. This business model concept can be used as a management tool to analyze the current business as well the company as a whole while some business model concept is popular among the startup to justify the market needs, market demand, and crowdfunding. This can serve as the tool to communicate, identifying the market demand, presenting the idea to stakeholders as well to the investors (Shi, Manning 2009).

The business model is instrumental and efficient when a company uses a proper business model through innovation. The company who uses the well formulated and innovative business model gain a higher return compared to its competitors (Afuah, Tucci 2001). Amit and Zott (2010) in their study they gave a recent example to demonstrate the importance of the business model that, Apple corporation is one of the most valued IT company in this world where back in early days Apple’s concentration was making computer and related hardware products, but in the recent time they changed their business model and to put more effort on iPod, iPhone which is combination with iTunes software and apple manufactured hardware products. This
made them an extended lasting service component and made them even more successful.

Coming to the another significant element of this study Blockchain, Many government have published many reports on the potentials of blockchain, it is also an exciting topic among researcher for the last two years there has be around half million publications and 3.7 million Google search for the result for blockchain (Carson, Romanelli, Walsh, & Zhumaev, 2018). The Blockchain is an undeniably creative invention by Satoshi Nakamoto who is known for implementing the first blockchain for maintaining the first decentralized digital currency named bitcoin and since then this advanced into something more significant (Maurer, Nelms, Swartz 2013). The term blockchain is an endless list of blocks which contain numerous records using cryptography (Böhme, Christin, Edelman, Moore 2015). According to (Don, Alex Tapscott 2016) the blockchain is a secured digital ledger of financial transactions that can record not just financial transactions everything of value. The hype of this technology came due to cryptocurrency Bitcoin, and most of the people often think they both are the same as bitcoin is a very narrow solicitation of the blockchain technology. The blockchain is still in the early stage of its development; some people think Blockchain is more like the internet in the early 1990s, and it will develop with time (Mougayar 2016).

Blockchain technology comes into public interest with the development of Bitcoin, it is a virtual currency, and it is implemented in early 2009 using this technology. This technology first developed to make the transaction of Bitcoin (Nakamoto, 2008) is a distributed ledger that ensures data records and confirmed by the participating nodes. Perhaps, bitcoin was the first decentralized, open ledger the accomplished popularity around the world (Pilkington, 2015). The Economist (2016b) draw attention to make a difference between the technology behind the bitcoin and the overall idea of blockchain technology. It is also a data structure that makes digital ledger and shares it among distributed networks of computers (Iansiti, Lakhani 2017). The recorded data cannot alter, and it is secured by design; therefore, there is enormous demand arises in the financial sector, general health also in the energy sector (Böhme, Christin, Edelman, Moore, 2015).
Blockchain appealing due to its transparency and security. Blockchain is decentralized; blockchain also cuts the intermediary by eliminating the need for a third party when it comes to financing. The increased safety and efficiency make it an excellent tool for nearly any business, but especially for those dealing with international transactions for faster and secured means of transaction. Bitcoin and other cryptocurrencies were the preferred payment method for many employees, contractors, and vendors because it creates less contact than the traditional financial system. Whether it is to track the supply chain of products across international borders or the global decentralized storage, blockchain can reduce the hassle, worries, and mistakes involved in doing business overseas. There have been many reasons to use the blockchain technology for the smart city service. The preliminary purpose is operational efficiency. Organizations associated with blockchain service need to adopt the strategic decisions made by city organization. Blockchain ensures secure data by decentralizing data storage. Blockchain service can manage the IoT devices installed for efficient smart city service for efficient traffic control, waste management by proper smart contract (Christidis, Devetsikiotis 2016). Blockchain technology can also help in the smart energy area by maintaining microgrids (Mengelkamp, Gärttner, Rock, Kessler, Orsini, Weinhardt 2018), this can also help in the smart charging for the electric cars. To reduce the money laundering activity blockchain can maintain the proper KYC as track the financial activity of a specific customer. Some country like Sweden is experimenting the land registration data with blockchain technology.

Blockchain has potentials in other smart city areas for example in the security management is precisely in the digital infrastructure, cyber threats. Blockchain breaks the traditional security system and creates a more transparent and secure system based on cryptographic data structure, and the cyber attacker is not able to destroy such data structure. This technology also saves time and costs as the data is continuously monitoring by the others on the network. Some companies are partnering with the government and providing this kind of service maintaining confidentiality and security. There are much more features of the blockchain services; some of those bring the value in the short term future, and some bring in the long term future. It can ensure the data storage in many servers instead of one single server and ensure no single point of failure. The block data cannot be altered at all the nodes use hash algorithms that ensure the transaction is valid and eradicate the fraudulent activity.
Incorporating Blockchain enabled service in smart cities will make it the more capable platform that connects cities into multi-dimensional service with more secure and transparent way. Studies show that now more than 50% of the population lives in the cities and this expected to reach more than 67% over next thirty years and most of the cities currently facing problems managing administrative, logistical, environmental and organizational issues (Cohen 2003). On the other hand, (VTT, 2017) given statistical data of cities in the global context occupy around 02% of the land but cities contribute 70% of the total economy of the country, it consumes 60% of the energy produced, responsible for 70% of the GHG emissions and generates 70% of the waste. Urbanization is a trend where 93% of it is stirring in the developing nations, 78% of the citizens now living on the cities and 90% of the innovations held in the cities (VTT, 2017), which gives the intuition to focus more on the smart planning, and cities to become resource efficient. Now cities are more concern about the challenge of low-carbon emission and resource efficiency, many consultants and service professionals mentioned Blockchain is a significant technology to pay attention, and they are continuously monitoring its prospects and possibilities (WEF 2016). Our neighboring country Estonia Government has also taken an interest in this technology (Palmar, 2016) and using it for some public service.

The best solution to these issues is the advancement of smart cities, which is a concept using information and communication technologies. To move forward with smart cities blockchain can play a crucial role in this process for its openness and the full range of technological innovations (Sun, Yan, Zhang 2016). There are few industries where blockchain technology already introduced including finance and banking (Hasse, Perfall, Hillebrand, Smole, Lay, Charlet 2016), smart contract (Peters, Panayi 2016), telecommunication (Yrjölä, 2017), Internet of things (Zhang, Wen, 2017), supply chain auditing, public pooling, government, retail, real state, crowdfunding and many more. In this research, we will show six main features of the smart city, and how blockchain can contribute on those areas for the feasibility of to reach out to citizens and covering all the significant sectors, we will also focus on business models as it gives a holistic view and uses CLA to study the future.
1.1 Research Objective and Research Questions

During the literature review and after reading a handful amount research paper, I found there is a minimal number of academic research or journal on the business model of blockchain technology. More specifically on smart city context, there is limited research done, but in practice, many cities are transforming from a traditional city into a smart city, as discussed earlier how Palo Alto, Riverside using technology and transforming to a smart city and ensuring the quality of life for its citizen. Though the concept of ensuring perfect quality or standard of living is nothing new, in 1516 Sir Thomas More in his book “Utopia” gave a concept of a fictional island in South Atlantic Ocean where utopia imagined a community with the nearly perfect quality for its citizens (Giroux, 2003). Utopia focused on the quality of life and designed as a perfect place to live. Same as the smart city concept that focuses on the citizen facilitation. During the secondary data collection I found out one city entirely concentrated on blockchain enabled service and the company named Blockchain LLC announced their first blockchain based smart city over 67K acres of land in Northern Nevada, the aim of that futurist city would use various blockchain initiatives to contribute in the ecosystem (News BTC, 2018). This indicates the prospect of a smart city and blockchain enabled smart city services. It is a widespread phenomenon that, blockchain can make a revolutionizing change in smart cities.

This study aims firstly introduced to the idea of the blockchain and smart city services from the viewpoint of the industrial economy, and this will make a connection between business and technology. Secondly, this study will also focus on the business model of city organization and the influence of new technology on the city business model. This study will merge the idea of the business model, and blockchain enabled smart city services. The subject is fascinating in recent time: there is hype around this blockchain technology though there is very little information on its aptitudes on different industries (Iansiti, Lakhani 2017). This technology has already been proved and aiming high for success in other industries. This decentralized public ledger where data modification or alteration is not allowed, here all the data transferred in an encrypted format; therefore the data can be used without manipulation which helps to reduce the bureaucracy and maintain the transparency (Tapscott & Tapscott, 2016), which is very much needed in the public sector. This technology can be implemented
in many areas mainly in the area of finance, public pooling, energy sector, health data, and information (Mattila & Seppälä, 2015) but this research will focus on six features of the smart city and how blockchain can contribute in those sectors. This research study will concentrate on blockchain enable service for smart cities and which allow using the business model and making develop smart cities for the future to meet the support of the massive number of population.

The study will use the method of future study tools. Glenn and Gordon in 2009 in Futures Research Methodology Version 3.0 discussed the future studies methods. Future studies and future research can be categories into two major group based on desired future and possible future those are known as normative and exploratory (Glenn, Gordon, 2009). There is some known method to study the future; some well-accepted research methods are the Delphi Method, Real-Time Delphi Method, and Trend Impact Analysis, Cross Impact Analysis, and Casual Layard analysis. In our research, we will use the CLA tools for short study term, medium term and long-term future of this industry. This tool uses four layers proposed by Inayatullah (1998) which investigate the trends & events happening around us. Litany, system, worldview, and myths are the layers to study short and long terms future.

It is expected that blockchain service will disrupt successfully in the smart city sector but what kind of blockchain service it will offer and what could be the business model of the city corporation is unknown so far. Find out how this blockchain will disrupt in the smart city and what how it will develop the business model I have constructed the research question:

- *How could Blockchain influence Business Model the are to be developed for Smart City Services?*

To answer the main research question, we need to uncover the opportunities can continue blockchain offer for the future how it can influence business model. Therefore additional research questions of the study more specific to the Business model and opportunity of blockchain offering in the business model context and these sub-questions are:
- How blockchain can contribute to smart city context?
- How could Business model elements evolve in the future?

From this research question, we can answer not only the potential Business model of Blockchain enables smart city services, but we can also identify the features of the smart city and its offering to the citizen. The research findings will help the industry player to show a guideline that at the same time they can identify the emerging sectors related to the smart city sector. Smart city and blockchain enable smart city services is the future industry which requires continued study throughout its development. The number of academic research done on blockchain mainly focused on the context of cryptocurrencies mainly with the evolution of bitcoin. Therefore the research question can help to find a new horizon in this industry, but this future study requires continuous study.

The purpose of this study is to uncover the future of blockchain enabled smart city services. This study is qualitative research, the primary data collected from the persons related to smart city industry. Two of them directly related to the smart city initiative from the city of Oulu, and the other one is Research from the University of Oulu. To see the future, the study used Casual Layered Analysis. The analysis method has four stages, named litany, systematic, worldview, myth, and metaphor. This method will give an overview of the core problem, feasible solution, and who will solve the problem. The study used this method to see the context in multiple levels, this method also gives the alternative scenarios to see the probable future. CLA method also helps the city managers and policymakers to make strategies for short term, mid-term, and long term future. Using this method, the city managers and researchers will see the probable future smart city. This study also uses the Busines model lens to see the probable future of the city organization.
1.2 Research Structure

The thesis topic involves three major areas (blockchain, smart city service, and business model) and for the methodology, the study using layered causal analysis and all those are currently a hot topic in the business literature and practice. I tried to put my best effort to maintain a flow from the very first chapter to the end and use relevant papers from different sources. The first chapter is an introduction including the research topic, research question, the research gap, the research approach to the study. This chapter will give a brief idea about the thesis concept of Blockchain, Smart City and Business model and all of those topics will be explained in detail in the literature review chapter. The following chapter is about the theoretical framework, and this chapter shows that the theories and concept have used in this research also links the theoretical understanding of our research question. This chapter will give sufficient comprehension of what the blockchain technology is all about and how it can disrupt in the smart city context through the thesis will not go into detail of this technology but will present a general idea about it. Apart from the blockchain technology, the author will also describe the theoretical background of the smart city. However, the main focus will be on the business model and how smart cities can enable blockchain as a tool and using the business model and allocate the resources appropriately. The author will also focus on how blockchain can contribute to the business model of smart cities.
After the theory part, the context part will describe the subject topic based on the research approach. Then the methodological part explains the reason for using quantitative or qualitative research and justification of the research approach. In this chapter, I will focus on technology and how it can contribute to the smart city sector. As the blockchain is relatively new technology and the amount of research of this technology in the smart city area is limited too therefore the estimated outcomes are undefined as a result I will try to give a holistic overview of the impact of this technology as well the contribution of the business model from the city corporation or municipalities point of view. In the following parts, the author will discuss the data collection, summarize, integrate, and interpret following the research question and analysis based on experts and industry related parties. Here the data collected from the interview will be the main focus. In this chapter, I will analyze the data insights and will compare with the theoretical overview.

The final chapter conclusion and discussion concludes by answering the research question as well as they provide a summary of the thesis paper. Here the author will also discuss the possible outcomes for blockchain technology in the smart city context and how it can influence the business model. Finally, the author also discusses the research limitation and along will the possible future researches scopes.
2 SMART CITY

In this chapter, the author will demonstrate the conceptual background of this study. In the beginning, the author will describe the content of the smart city, the emergence of the concept, how it is different from traditional cities, what are service offering then move into the blockchain enable smart city services and how those blockchain enable service can make business impact of the city corporation as well make contribution for public sector.

2.1 Defining Smart City

The concept of a smart city may vary to person to person based on their idea, but the mission of smart city is to optimize city functions and improve the socio-economic aspects to improve the quality of life by using smart technology and data analytics (Chourabi, Nam, Walker, Gil-Garcia, Mellouli, Nahon, Pardo, Scholl, 2012). These cloud-based IoT applications collect and analyze and manage data in real time to help municipalities, citizens to take timely decisions to improve the quality of life.

In the marketing linguistic smartness is positioned as something user perspective as needs the endorsement from the border community members (Klein, Kaefer, 2008). Smart is not only intelligent it is much more user-friendly, and it has a quick and adaptive mind to provide something customized for concentrating the user as Smart city also adaptive to its citizens and able to provide customized service based on the user needs (Marsa-Maestre, Lopez-Carmona, Velasco, & Navarro, 2008).

As discussed earlier this concept is still emerging, and its function or defined activity is still in progress. This concept has been used all over the world with different meaning and a different context. There is no clear definition of a smart city, some author used it as an urban digital concept, and some used it as digital infrastructure. Several definitions have been taken for both practical and academic use.
Table 1: Definition of Smart City

<table>
<thead>
<tr>
<th>Author</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giffinger, Fertner, Kramar, Kalasek, Pichler-Milanović, Meijerss, (2007)</td>
<td>“Smart city has six characteristics (people, economy, governance, mobility, environment, and living) that are based on the intelligent combination of the activity and resources of self-decisive, independent and conscious citizens.”</td>
</tr>
<tr>
<td>Hall (2000)</td>
<td>“A city that monitors and integrates the conditions of all critical infrastructure such as roads, bridges, tunnels, rails, subways, airports, seaports and communications as well as water, power and even large-scale building can make optimal use of resources.”</td>
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<tr>
<td>Toppeta (2010)</td>
<td>“A city that connects the physical infrastructure, IT infrastructure and social infrastructure of the city to build the collective intelligence of the city.”</td>
</tr>
<tr>
<td>Washburn, Sindhu, Balaouras, Dines, Hayes, Nelson, (2010)</td>
<td>“Using smart computing technologies to increase smart connections, the efficiency of critical infrastructure components and services, including city administration, education, healthcare, real estate, public safety, mobility, and utilities.”</td>
</tr>
</tbody>
</table>

Table: Definition of Smart City

From the above definition, we can undertake that smart city means: The use of smart computing technology to make interactive infrastructure which includes people, environment, healthcare, governance, transportation, and energy to make the much more efficient than a traditional city and maximizing the benefits of its citizen.

2.2 Evaluation of Smart City

In November 2008, the IBM CEO Samuel Palmisano gave a speech at Foreign relation council at New York on “Smart Planet: the agenda of the Next-Generation Leaders” and he discussed a concept of Smart Planet. In the following year 2009, Samuel Palmisano again discussed the Smart Planet in among the U.S. Business leaders and the concept was appreciated by Obama (Su, Li, & Fu, 2011) and the concept of Smart Planet was to plan for the sustainable future and making through proper utilization of the “Internet of things”.

The smart city mainly focuses on applying the information technology to contribute to all the sectors of life from the embedded sensors on traffic lights, railways, roads. Buildings, industries to all the other objects in every corner of our life. If all the citizens
of the city connected through the internet then we can integrate the IoT through cloud computing system. In such cases the people can manage life in more dynamic was using intelligence and reach to Smart Planet using the Internet and the Internet of things. The concept of the smart planet put forward and the concept of the smart city, smart grid, smart buildings came. Now the concept of the smart city is one cutting edge issue, and all the city are building such cities can utilize the internet and IoT enabled devices (Su, Li, & Fu, 2011). The smart city also can respond to different needs from daily life, governance, city services, industrial and commercial activities (Qin, Li, & Zhao, 2010). It can be assumed that that smart city a the approach of “smart planet” to achieve integrated management of city service, the integration covers the smart planning, smart construction, smart management, and development process (Su, Li, & Fu, 2011).

We already find the terms like smart city, digital city, smart city, ubiquitous city and all those terms are quite near to each other as all those highly dependent on the technological and ICT aspects. A smart city is an updated version of Digital Cities. Historically the evaluation of smart city happened around ten years later than the digital cities. The concept of the digital city is related with the internet of things, where the city is connected to the internet that with the ICT platform and manage the vast amount of data gathered from through the IoT devices and can offer new services to the citizen of urban areas and manage a better living to city dwellers. Here making the city more sustainable and enabling the development of living is the primary target.

Shared economy and smart technology are playing a pivotal role like ride sharing, electric transport, sensor-based traffic control, etc. It collects the date on real-time and serves for the public. It also promoted safety and focused on renewable technology. According to (Ishida, 2017) the digital city is the exploration of cyberspace. The digital city divided into three categories: 1. Social Interaction 2. Virtual space 3. Connection virtual and real spaces (Ishida, 2017). There has few project city, and this aimed to supply relevant information for day to day like and to make a connection between virtual worlds with the real world (Ishida, 2002). Here cities mainly collect data through IOT and create an interconnected network for social interaction with the citizens. A smart city is also considered a sizeable digital city; it establishes visual, city management and operation with intelligence. The smart city uses the smart sensor
network, control network, and safety network and equipped sensor to access data from IoT devices and integrate the service through the super and cloud computing system (Su, Li, & Fu 2011).

This concept of the digital city is also related to the smart city. Here this concept does not deal much with computing power, database, knowledge transfer competences but this innovation learn from the technologies and application of those into solving the problem of citizens (Eckerson, 2003). This concept evolved after the 1990s after the use of the internet in public, and during that time the information available was static, and after one decade the information tended to change and became much more interactive and the significant change being after 2005 when the provided information is not only interactive but also became a platform for citizen engagement, and eventually this concept became popular among citizens for interactive communication.

On the other hand (Jenks & Dempsey, 2006) in the book “Future Forms and Design for Sustainable Cities” mentioned that it is a concept of digital infrastructure concerning the original buildings. Initially, the concept of intelligent building studied during the 1990s, and the idea of those building was to examine the effectiveness of building concerning weather changes, but shortly it changes its focus into building intelligence (DEGW, 1992, 1999; Harrison et al., 1998). The concept of ubiquitous cities is the updated version of the intelligent city. This aim to serve all the citizen and access to all the services, it also delivers service to anybody anytime and from anywhere. This service can be accessed from any device. The concept of the hybrid city mainly targets to information communication Technologies for supporting sustainable cities for empowering the citizens.
Apart from all those city concepts, there is some meaningful connection with some other city concepts, and some of those are Knowledge city, sustainable city, talented city, wired city, eco-city, etc. (Nam, Pardo, 2011).

2.3 **Smart City: An ICT Based Approach:**

With secure wireless connectivity and IoT the traditional elements of city life into a next-generation platform with expanded capabilities. It also includes micro power grids like solar power and a cloud-based central control system that connects other assets in the ecosystem. There are a few essential elements to ensure the prosperous smart cities and those are wireless connectivity, open data system, ensured security, flexible monetization. Currently, all the city concepts are overlying one another, such as digital city, smart city and the smart city contains most of the elements of those cities. The structure of the smart city has specific layers including perception layer, network layer, and application layer aiming to the measurable, interconnected and intelligent world (Liu, & Hou, 2010).
2.4 Fundamental Component of Smart City

Building smart cities are much more different than a traditional city. Based on the conceptual variations we can find out the keys components of smart cities. We can simplify all the critical factors into major three categories, and those are technological factors, human factor and institutional factor (Nam, Pardo 2011). Here technology factor mainly deals with the physical infrastructure, digital networks, smart, mobile and virtual technologies. Human factors deal with social infrastructure and social capital more specifically to creativity, education, and diversity. Institutional factors deal with the smart community and smart growth more precisely into the governance, policy, and regulations.
Any area of city development or management can be incorporated into a smart city initiative (Chourabi, Nam, Walker, Gil-Garcia, Mellouli, Nahon, Pardo, Scholl, 2012). The basic principle of a smart city is to improve the quality of the citizen’s life, excellent uses of municipality resources. Citizens engage with this smart city ecosystems in so many ways using smartphones, mobile devices, smart cars, and smart homes. An elementary example of smart city initiative is getting the parking space in crowded city blocks through the smart parking meter this also facilitates the digital payment system which gives the ease to payment to City Corporation and does not hassle with coins. Also, the municipality uses the smart sensor to make the streetlights dim when there are no vehicles and pedestrian on the roadways. With this interconnected system communities can improve energy distribution, waste management, control traffic and improve air quality. According to (Nam, Pardo 2011) there three factors or necessary components of smart cities: those are Technological, Institutional, and Human Factors.
Technology Factors: The base of smart city concept is on technological factors as well on the ICT factors as the use of ICT transform life and city infrastructure in very fundamental ways (Hollands, 2008). Utilizing the traditional cities and bring technological and factors can make one city from Traditional city to Smart City. A well-functioning infrastructure is mandatory for the smart city, but the infrastructure alone cannot make a smart city unless the collaboration from both the public and private sector as well as real collaboration and engagement is mandatory and here technology and ICT application can play the vital role (Lepouras, Vassilakis, Halatsis, Georgiadis, 2007). Most of the research on smart city seeks to infrastructure and enabling technologies, and those studies are focused into those above issues that strain the convenience and readiness of those systems (Giffinger, Fertner, Kramar, Kalasek, Milanović, & Meijers, 2007) and (Giffinger, Gudrun, 2010). Technology factors can be categorized into the following categories, and those are Physical infrastructure, Smart technologies, Mobile technologies, Virtual technologies, Digital technologies. Here physical infrastructure supports services within the smart city with the hardware platform. Smart technologies, Mobile technologies, and virtual technologies deal with smart and interconnected service and enabling the functions of smart cities. Digital networks help to connect all the technological components within the smart city.

Institutional Factors: Its normal phenomenon that ICT and technology are vital factors for the smart city, but it will not work without the institutional factors like governance, policy, and regulations. Instructional factors ensure smart community and smart growth which means without the proper governance and support it is not possible to build and develop the smart city.

Human Factors: Human factors are also crucial for smart cities like technological and institutional factors like we know the aim of the city corporation or municipality to the smart city is for facilitating citizens. Unless humans involvement the ICT Application and technology will not mean anything. Its citizen of a municipality who define how a city should be developed and maintained. Human factors will connect the problem and seek a solution and the people who contribute to the smart city mentioned as smart people.
2.5 Smart City Services

Based on the smart city definition and concept, a smart city can be identified by six primary dimensions namely: smart healthcare, smart governance, smart mobility, smart energy, smart environment, smart people (Balakrishna, 2012) and those primary dimensions are divided into some other defining factors such as: Smart people are described not only by the level of citizens' qualifications or education but also by the quality of social interactions with respect to integration. Smart governance includes aspects of citizen service, political participation, and administration functioning. Smart Mobility is concerned with the availability and accessibility of modern and sustainable transport systems. The smart environment is described by natural conditions (climate, green space), pollution and resource management as well as efforts to protect the environment. Smart healthcare service is the integration of doctor patients and bringing the whole system is a single platform. Smart energy deal with the energy sources considering the environmental and carbon emission and making efficient of those micro energy sources. Few other smart city elements that also need to be taken under consideration and those are Smart Living includes different aspects of quality of life, including culture, health, safety, housing, tourism, etc. Smart Economy includes economic competitiveness factors such as innovation, entrepreneurship, labor market flexibility, and (inter)national market integration.

2.5.1 Smart Healthcare

In the context of the smart city, smart health refers to a range of information and communication system that can be deployed in the healthcare application. In the smart healthcare system; health data management, communication tools including health care support, telehealth integrated into the same platform (Maeder, 2008). For efficient healthcare, ICT enabled service required, and the purpose of smart health is to connect doctor, patient in the same platform for seamless communication which will facilitate faster service in choosing better treatment, problem forecasting as well collecting information about the sudden change in health issues (Kim & Xie, 2015). Smart healthcare will also enable doctors to give treatment remotely (Naphade, Banavar, Harrison, Paraszczak & Morris, 2011). It also enables to record health data for a more extended period which is known as EHR or Electronic health record (Han,
and the purpose of EHR is to store data for the lifetime and ensuring health care and use those data for study purpose. It will enable individuals to view medical records over a certain period, and doctors can see previous records and take decision more effectively (Maeder, 2008). Smart health also enables patients to take doctor/nurse appointment for medication or other medical needs through online which will faster the overall process (Naphade, Banavar, Harrison, Paraszczak & Morris, 2011). Smart healthcare service is highly sensitive, deals with all those private information and smart healthcare need to ensure the data security and confirms that the only authorized personals can access to those data (Maeder, 2008). The data protection should be on the highest priority where blockchain can be a useful element using a smart contract tool. Smart healthcare also enables patient data could be used for analyzing the information which enables to give health pattern and predictions (Piro, Cianci, Grieco, Boggia, & Camarda, 2014). This data analysis will trace patient’s behavior before and after the problem and this can data can be utilized in the change in the health problem within the smart city (Pan, Qi, Zhang, Li, Wu, & Yang, 2013).

The rise of Electric vehicles and autopilot vehicles gives the concept of electric ambulances proposed by many researchers. Though there are many downsizing issues like higher vibration, limited size of workstation for medical treatment hence (Kawakamis et. all, 2005) proposed a design concept of EV ambulance includes different types to which enables the smooth vibration, cancels the noise and reduces the height of the floor to create more space in the workstation. Another critical element of smart healthcare is to ensure quick health service of accidental emergency patients. Intelligent Traffic Light system (ITLS) can provide a smooth flow of emergency vehicles like ambulance, fire service to reach the destination in time avoiding the delay by traffic congestion, here the idea is to control the traffic lights mechanically in the path of ambulance or fire service. Here those vehicles controlled and those controllers identify the location of the accident spot through sensors and intelligent traffic movement, and once it identifies such issues, it controls traffic lights and helps to reach the vehicles on the spot (Iyyappan, Nandagopal, 2013).
There is another essential part of medical data, and it has burdensome regulation to maintain it is electronically. In the smart healthcare arena, we need to such innovation and engage patient to access their medical data. Blockchain technology can handle decentralized EMRs (Azaria, Ekblaw, Vieira, & Lippman, 2016). The data management can give them access to the patient’s complete, easy access to their medical information and among the medical service providers and treatment websites. The blockchain technology can manage authentication, confidentiality, and data sharing when handling sensitive information through a smart contract. Here medical stakeholders can participate as miners; here the miners will be rewarded with aggregate and anonymized data after securing the network via proof of work (Azaria, Ekblaw, Vieira, & Lippman, 2016).

Electronic communication with patients is another quick service that smart service can offer. Here we can integrate the service like an interconnected response or AI messaging system. Multiple channel communication. This distance medical service enables a greater community of care by continues improvement and supporting coordination. This also facilitates communication between medical service centers and patients and this should not be limited to the physician to physician communication. (Balas, Jaffrey, Kuperman, 1997).

Figure 5: Smart healthcare framework
2.5.2 Smart Governance

The aim of smart governance is enabling transparency in policy making and implementation, facilitating open data policy, ICT and e-government for accountability. E-Government enables ICT activities in the public sector (Johansson, Lassinantti & Wiberg, 2015). It also brings new technology and ideas to facilitate the public sector (Anthopoulos & Reddick, 2016). The purpose of e-government is to creating multiple levels of communication between the government with the citizen (G2C), a government with government stakeholders (G2G), a government with businesses (G2B) to make all the parties more open and efficient (Mellouli, Luna-Reyes, & Zhang, 2014). Smart Governance engages citizens and ensures the quality of service mainly interacting between using internet-based communication channel and government can improve service based on the feedback from the citizen. For a better understanding of the government’s decision making or feedback, citizens require more information about the government's policy and government take the initiative to make those easily accessible for the public which will increase in the citizen participation. Now social media formed this community to stay connected, and the more people are interested connected with the platform (Johansson, Lassinantti & Wiberg, 2015). Government service design also can be changed or modified based on the feedback from the citizen. The feedback can be analyzed to study further service design (Mainka, Bech-Petersen, Castelnovo, Hartmann, Miettinen, & Stock, 2016). Considering those the main aim of the smart government is to connect citizen with government and sharing relevant documents and communicating in both ways and fulfilling the task and engage in decision making, participating and improve the service quality.

The government can interact with the citizen by sharing data electronically and get further feedback based on polling service or feedback service, and the government can also send emergency communication using alternative channels. Smart security & privacy should be another concern for smart cities. Smart security includes illegal access to information and causing physical disruption in service availability. Privacy includes the protection system that accumulates data and initiates an emergency response when needed. Now this is very important as humans are interconnected through smart devices and home, cars, social systems are now being connected which
improving our living standards, smart city infrastructures and services changing continuously for monitoring, controlling and automation. This integrated system will increase public safety, disaster recovery as well as cyber security (Elmaghraby, Losavio, 2014). In the smart education system, the teacher can analyze the progress of student data. The teacher can improve the process of their result maintaining confidentiality. The smart education system will keep connected both the student and teacher and student can take a lesson while being in a distant location. This interconnected system is based on interconnection, instrumentation (Bătăgan, 2011).

Figure 6: Smart Governance Framework

2.5.3 Smart Mobility

Smart mobility or smart transportation is another core feature of smart cities. The first initiative of smart mobility prioritized non-motor option which reduces less carbon also an optimum movement that saves time and money. This is very closely related with the smart energy regarding smart vehicles or electric vehicles as it is directly dependent on smart energy system (Galus, Waraich, Noembrini, Steurs, Georges, Boulouchos, & Andersson, 2012). With the development of the sharing economy, smart transit companies are focusing on this so that the demand of citizens always fulfilled — ride-sharing standard in the smart city which is also part of smart mobility. The demand for smart cities is rising day by day, and smart mobility is one of priority in recent times (Boehm, Flechl, & Froetscher, 2013). There is some motivation for the smart mobility features of the smart city this is also related to smart energy as both aim to minimize the carbon emission and as well as cost (Saber & Venayagamoorthy,
2011) as traditional transport industry is responsible almost one-fourth of global carbon emission. Smart mobility can enable the electric vehicles and utilize the renewable electric to fill this gap which can contribute to reduce the global carbon emission and reserve the fossil energies. For reducing the cost, we can use renewable energy or solar energy.

Another reason for smart mobility is needed for urban growth. This urban growth causes many activities mainly companies and corporate office was moving from the city center to suburb and for comfortable and convenient transportation more private vehicles will be there in the following years. Though the route of public transport is increasing for the secure transportation and ease in lifestyle, many individuals prefer to have own transportation, and electric transport can play the vital role concerning lower carbon emission and cost of mobility (Boehm, Flechl, & Froetscher, 2013). According to (Hashimoto, Kanamori, Ito, & Chakraborty, 2012) the number of electric transport will reach around 10% in Europe by 2020, and according to (Reuters) around 31.2% of cars sales rises in 2018 Norway was electric car which gives a clear indication of this growing market, and it requires a number of electric charging ports and smart grid can manage this which will be helpful in terms of reducing the cost of energy and diminishing the carbon emission.

According to Miler and Ju (2014), the autonomies vehicle is much more reliable than human-controlled vehicles through autonomous vehicles have not adopted due to the technology trust issue. Though there have been various tests and the response of an autonomous vehicle is better than the human controlled vehicles. We have categorized the Smart Mobility or Smart Transportation features into three smart service area, and those are electric mobility, transport management, and route optimization. The electric mobility service is most dynamic features of smart mobility which aims to build infrastructure within city and suburb and creating electric plug-in vehicles within the city, and Smart city is responsible for creating those charging stations and connect with the smart grid for uninterrupted electricity and when the number will increase this increasing number of electric vehicles increase the demand for smart grid (Lee, Park, Kim & Jeon, 2011). Transport management gives that more control over traffic monitoring, control the usage of vehicles (Lee, Park, Kim & Jeon, 2011). The real-
time traffic control now does traffic control, and the service can be based on the traffic situation. In practice, we can access the traffic data and take measure to control it.

Figure 7: Smart Mobility Framework

2.5.4 Smart Energy

In this chapter, we will demonstrate smart grid feature, and for this, we categories this service layer into three stages (Figure 08) and the first one is smart service, the classified that into the smart application than into smart activity. Energy conservation and efficiency are the two primary focus of smart cities. One of the main targets of smart energy is to optimize the energy utilization at a maximum level and pursue it often they share energy within their community. This aims for low-cost energy production to keep low-carbon society as most of those energy sources are renewable energy (Ghansah 2009). One of the main reason to use renewable energy source as it has a promising future and focus on reducing greenhouse gas (Kanchev, Lu, Colas, Lazarov, Francois 2011). The smart grid is also known as ICT empowered electric grid and sharing the surplus energy or reducing the carbon emission is not the only purpose of the smart grid. It’s mainly an ICT based infrastructure that use the existing the energy sources and assimilate more energy from the small grid-like solar panel as well from the smart devices and delivering the accumulated energy in more secured ways through control and monitoring capabilities using automatic grid configuration to avoid return outages which can be done by self-healing competences this permits consumers to have more control over their electricity consumption (Giordano, Gangale & Fulli, 2011).
The evolution of the smart grid will allow the individual customer to government level to have substantial control over the electricity consumption and researchers and government now put effort to make various smart grid design and strategies. A simple example of using the smart energy or smart grid is to use the smart sensors to make the streetlights dim when are not facilitating anyone which can also be done in the smart home. The smart grid also enables to improve the operations with smart maintenance and planning. Smart lightening is related with the smart energy, and it is assumed that the municipality uses roughly 5% to 60% of the total electric consumption for public lightening (Rossi, Gaetani, Defina, Dominici, 2016). Public lightening is significant for city dwellers for movement mainly for pedestrians and bicycles, and it ensures the safety then this is also important for a city view and which play the role for attracting tourists as well as business (Rossi, Gaetani, Defina, Dominici, 2016). Currently, most of the city using the scheduled lightening system which can be developed and can implement the sensor based lightening system which will save energy and money. Another critical aspect of smart energy is smart building, and this can save energy. Smart buildings adapt to grids conditions and communicate with other buildings; this can also act as small microgrids or virtual power plants (Snoonian, 2003). As shown in figure 08 the smart building can monitor the energy and play a vital role in building safety and environmental monitoring. The smart building consists of sensors that monitor and submit a message in any changes, and there is an interface to communicate with the system of central unit and controllers. It can store energy from renewable sources and smart meter, and the smart contract can distribute excess energy (Snoonian, 2003).

Figure 8: Smart energy framework
2.5.5 Smart Environment

Smart cities also aim to monitor environmental concern such as climate change, cleaner air, and waste management. Sanitation and waste management managed by IoT-enabled vehicles for the collection of waste and removal of it. The smart city also can use the sensors to measure the water and with IoT enable water management system can ensure the water quality of drinking water. Urbanization and with an increasing number of industries and transportation to solve the environmental became more critical, as to create a sustainable and smart city the concern for the environment is growing even higher. To create a sustainable smart city we divided the activities of a smart city in three primary domain and those we discussed in figure 09, it will concern mainly on waste management, air quality management, and water management.

Waste management is also called waste disposal are the activities and action measurement taken from the beginning to the final disposal. This includes waste collection, carriage, handling, dumping or recycling following monitoring and waste management technique and regulation. However, the smart city does not only recover the waste but to recycle the waste or to generate power that will be served for the smart city itself. The main task of the smart waste management is to a collection of waste is such a manner that reduces the trash, utilization at a maximum level that saves times, energy, money and most importantly that contribute for the environment.

In Swedish capital, the city organization initiated a way to collect waste and transfer those to a central hub through a suction pipe that can save energy and time. The implementation of the smart waste collection can improve efficiency and in waste transport management. It can be collected waste from trash bins connected to a network where the waste will be in a center by the suction pipes at a higher speed (Shukla 2016). In practice the collection of waste takes more than 80% cost for waste management (Poser, Awad 2006) and now most of the waste collection done through the track but if we want to reduce the time we can install in a sensor or IoT device that will automatically transmit data when the waste meet a certain amount in the bin and the trucks could be manage dynamically and optimize the route based on trash and location and redirect to nearest waste hub from where the waste can be transported to
recycled location or recovered location. Concerning any obstacles, the vehicle will be redirected to another route (Shukla 2016 and Poser, Awad 2006). Through the sensor we can optimize the trash level and through the route optimization, we find only those dumpster that reaches to a certain level and tracks can schedule the routes in advance and dynamically collect the waste and dump it to a nearby hub and do not drive that almost empty bins.

Monitoring air quality is another role of the smart environment as with an increased number of population. The first task is to notify citizens about the air quality and give data about the taking measurement, and smart city takes the data from sensor installed in vehicles running in different parts of the city and gather data and those data analyzed and the data mining study the pattern of the air and warn citizens in advance and therefore the citizen can take measure steps (Shirai, Naya, Kishino, Yanagisawa 2016). Smart Water Management focuses on ensuring pure and safe water to every citizen of the country.

According to (Rapousis, Katsarakis, Papadoupoli 2015) around 25% of the world population will not have access to safe and pure drinking water and the number of countries with water deficiency will increase this problem will acute in the many parts of Africa and Asia which will continue to the water crisis in America and Europe. The smart city manages to water management smartly to ensure water for citizen for household activity and farming, and the smart city can implement a smart device to get the real-time data (Charef, Ghauch, Baussand & Martin-Bouyer, 2000). The data can be analyzed and notify citizens if there anything to worry. A smart city can analyze the big data and forecast if there any associated risk in the water and city authority can notify through the smart application or sending a push notification. This can be from both side citizens also can inform the city corporation about the water quality which will give the city corporation insightful data about the water quality. In this water management process, the wastewater can be a treatment to make them usable for the citizens.
The smart city builds to make life easy and manage everything in a way aiming to facilitate the quality of life of citizens in general. To make citizens life better we cannot think only on the lens of city authority we need to think it on both perspectives on the lens of City Corporation as well from the lens of the general population. The smart city aims to improve the quality of life of citizens and create more participatory citizens (Chourabi, Nam, Walker, Gil-García, Melloulí, Nahon, & Scholl, 2012) who will participate in the feedback or contribute to serving in a better way and when more people participate in the feedback will bring a more favorable outcome. The smart city needs more educated and participatory citizens who will contribute to their betterment when they realize their participation is valued; the citizen will also focus more on it. The smart city focuses on few factors communication, education, quality of life, accessibility (Chourabi, Nam, Walker, Gil-García, Melloulí, Nahon, & Scholl, 2012) to enable people and make them smart. The relation between government and citizen can be ensured by a proper engagement which can be done by e-participation and e-readiness. By e-participation government can interact with citizen and take feedback on by online pooling and discussion. E-readiness can ensure the capacity of participants in electronically. Those e-readiness and e-participation are closely related to one another as e-readiness ensures that citizens take participation in online participation. e-readiness includes e-education, e-business, and e-government. The government can also create smart human capital proper integration with businesses and inter-agencies, and this requires a digital workforce and micro learnings.

2.5.6 Smart People
2.6 Smart City Projects Worldwide:

The Intelligent Community forum (ICT) announce cities into smart cities based on five influential factors, and those are broadband connectivity, digital inclusion, knowledge workforce, marketing and advocacy and innovation (Nam & Pardo, 2011), and The Intelligent community forum announce it awarded as smart. In table No 02 the author has categorized into six demographic, and those are Asia, Africa, Europe, North America, Middle/South America, and Oceania.
Smart cities are increasingly using technology to improve public safety and monitor areas to combat with any critical situation and also transfer the data to mass people to send early warning system before droughts, floods, hurricanes. At the Smart City summit in Boston, it was discussed over the five years city of Chicago received 182000 claims against due to flood estimated USD 735 million in the account of property damages with the help of IoT smart city can use sensors and use cloud-based analytics and monitor the soils ability to absorb and filter rainfall. There is a common factor among all the cities, and that is all those cities are capable of meeting the growing demand for more livable cities. All those cities are using ICTs to shape integrated infrastructure to facilitate the citizen to the service of the city, and this infrastructure allows to mitigate the current urban issues and make cities into a better place to live on though there are few fundamental difference between smart cities in academic and smart cities in practice.

Table 2: List of Smart Cities

<table>
<thead>
<tr>
<th>Region</th>
<th>Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>Bangalore (India); Chongqing (China); Doha (Qatar); Gangnam District, Seoul (Korea); Hong Kong; HwaSeong- DongTan (Korea); Hyderabad (India); Ichikawa (Japan); Jaipur, Rajasthan (India); Jia Ding (China); Kabul (Afghanistan); Mitaka (Japan); Shanghai (China); Seoul (Korea); Singapore; Suwon (Korea); Taipei (Taiwan); Taoyuan County (Taiwan); Tel Aviv (Israel); Tianjin (China); Yokosuka (Japan)</td>
</tr>
<tr>
<td>Africa</td>
<td>Cape Town (South Africa); Nelson Mandela Bay (South Africa)</td>
</tr>
<tr>
<td>Europe</td>
<td>Besançon (France); Birmingham (UK); Dundee, Scotland (UK); Eindhoven (Netherlands); Glasgow, Scotland (UK); Hammarby Sjostad (Sweden); Issy-les-Moulineaux (France); Karlskrona (Sweden); Malta (Malta); Manchester (UK); Reykjavik (Iceland); Sopron (Hungary); Stockholm (Sweden); Tallinn (Estonia); Sunderland (UK); Trikala (Greece)</td>
</tr>
<tr>
<td>North America</td>
<td>US: Albany (New York); Ashland (Oregon); Arlington County (Virginia); Bettendorf (Iowa); Bristol (Virginia); Chattanooga (Tennessee); Cleveland (Ohio); Corpus Christi (Texas); Dakota County (Minnesota); Danville (Virginia); Dublin (Ohio); Florida High Tech Corridor; LaGrange (Georgia); Northeast Ohio; Loma Linda (California); Riverside (California); San Francisco; Spokane (Washington); Westchester County (New York); Winston-Salem (Carolina) Canada: Burlington (Ontario); Calgary (Alberta); Edmonton (Alberta); Fredericton (New Brunswick); Kenora (Ontario); Moncton (New Brunswick); Ottawa (Ontario); Quebec City (Quebec); Stratford (Ontario); Toronto (Ontario); Vancouver (British Columbia); Waterloo (Ontario); Western Valley (Nova Scotia); Windsor-Essex (Ontario); Winnipeg (Manitoba)</td>
</tr>
<tr>
<td>Middle/South America</td>
<td>Barceloneta (Puerto Rico); Curitiba, Paraná (Brazil); Pirai (Brazil); Porto Alegre (Brazil)</td>
</tr>
<tr>
<td>Oceania</td>
<td>Ballarat (Australia); Gold Coast City (Australia); Ipswich, Queensland (Australia); State of Victoria (Australia); Whittlesea, Victoria (Australia)</td>
</tr>
</tbody>
</table>

*Table: List of Smart Cities (Adopted from Nam & Pardo, 2011)*
3 BLOCKCHAIN

Information held on blockchain exists as shared and continually reconciles database where participating nodes reconcile this distributed ledger. According to (Crosby, Nachiappan, Pattanayak, Verma, Kalyanaraman 2016) Blockchain technology does not allow to store database in any single location like nowadays our bank or financial institutes do which means the data keeps genuinely public and easily certifiable which gives the data more secure from hackers to corrupt as the data is hosted by millions of computers and accessible to anyone on the computer. The shared ledger idea with a simple example we do every day of our life. There is the traditional way of sharing a spreadsheet or word document with another person is to send them and ask the recipient to make a review of it. Then we need to wait until the recipient sends back the reviewed return file to us. It is how the database works nowadays to the person cannot make the change at the same time, and this is how the bank maintains balance and transfer, and we need to update or reopen the ledger to see the changes. With shared files or spreadsheet like Google docs/sheets, all the participating parties have access to the same document simultaneously, and all the parties can review the changes, and we can monitor who can modify the version and who can only review it, and it is like a shared document. We do have many contracts, data to share among parties and instead of transfer to each other, we can make those into a platform where everyone can review it and check back from his or her end. In the Davos conference; world economic forum advised the significant part of global GDP will be stored on blockchain by 2027 (WEF, 2015). Many governments showed their interest in this technology; many investors invested in this technology. Venture capitalists are also funded for blockchain related start-ups, and in 2017 the amount was around one billion USD (CB Insights, 2017).

3.1 Defining Blockchain

Information technology and branches of information technology are already playing a vital role in the business and industries (Jakšić & Marinč, 2015). The Internet has created a new way of doing business with the revolution of e-commerce everywhere. The internet created a new way to do business differently. With times the technology we should focus right now is blockchain technology. This technology often compared
with internet in terms what internet made for the world and blockchain likely do the same for doing business, as it can secure business from every single step. Bitcoin is known as ‘digital gold,’ and as on September 2018 according to few sources the total value of the currency is more than USD 100 Billion and it can be used as other types of digital values. This shows that this technology making the radical impact and all the tech community is now finding other potential uses for this technology. This technology has built-in robustness and storing continues information and all those are identical across the network, and the single entity cannot control those blocks, and this technology does not have any single point of error since the inception of bitcoin. Any problem associated with bitcoin due to misleading or an individual’s intention (Cao, Cong, Yang 2018). According to Larry Summers, Former US Secretary of the Treasury said: “Bitcoin has the same character a fax machine had. A single fax machine is a doorstop.”

This technology is radiant and incorruptible as this lives in a state of agreement and this has a self-auditing ecosystem that the network reconciles all the transaction in every ten minutes intervals and all the transaction is referred as a block (Tapscott & Tapscott, 2016). The data in the network is public, and in theory, this data can be corrupted or altered, but in practice, the data cannot be corrupted or altered as blockchain using a considerable amount of computing power to supersede the whole network which practically not possible and ensure data soundness (Peters, Panayi 2016).

### 3.2 Concept of Blockchain Technology

Blockchain network makes up by ‘nodes’ as all the computer connected to the network that performs the tasks of validating and relaying transactions (Ali, Nelson, Shea, Freedman 2016). All the nodes create a robust second-level network where every single node join the network voluntarily and perform as an administrator of the blockchain and thus make the network decentralized. All the nodes join the network to win bitcoin as all the participants who can solve computational puzzles awarded with Bitcoin (Bonneau, Miller, Clark, Narayanan, Kroll, Felten 2015). Bitcoin is the reason to raise Blockchain technology (Tapscott & Tapscott, 2016), and there are estimated more than 1500 cryptocurrencies that this technology.
As defined blockchain is a decentralized technology here; it means the network operates on a peer to peer (P2P) basis. Here the entire network uses the technology to manage the database of records jointly like bitcoin manage is also managed by its network, not any central authority. Blockchain technology ensures the data security as all the data maintained by the network and managed decentralized data system and thus reduce the risk that computer hackers can do for data held centrally (Peters, Panayi 2016). Today’s internet has security issues and that known by everyone and here blockchain use encryption technology which ensures the data protection than to usual username/password system.

The sharing economy is flourishing over the last decade and companies like Uber, Lyft, Airbnb already proved its successes. Nowadays a person who wants a ride-sharing service relies on an intermediary like Uber, Lyft or who wants a short or long-term accommodation mostly rely on the hospitality service of Airbnb. Blockchain enables peer-to-peer payment and accelerates this kind of peer to peer transaction more faster (Decker, Wattenhofer 2015). The blockchain gives the freedom and ability to create value and creating authentic digital information. Smart Contracts transform simple contracts using simple coding when specified conditions are met. Ethereum is one of a blockchain project that realizes this possibility and has the potential to use in various industry (Tapscott & Tapscott, 2016). Still, this is in the early development phase but may have a prospect in the future as it can measure a specific benchmark and can perform automatically. Like a financial interment may have pay off policy after meeting a specific benchmark and using smart contract it can be paid off if all the conditions are being met.

Figure 12: Type of Public Ledger System

Types of Public Ledger system (Adapted from Blockgeeks)
In the blockchain, every transaction is an identifying code which is unique and unalterable, and that contain the unique piece of information (The Economist, 2016b). This hash value of the transaction that combined in the similar block the process of the system known as “Merkle Tree.” This new block contains a header with some new information from the previous block and the same happens in the further block. The information of the previous block cannot be tempered, and that prevents any data alteration (The Economist, 2015). The timestamp provides the existence of the data, and as well the delivers authenticity (Nakamoto, 2008). As the header or the hash become a mathematical puzzle and the miners solve the mathematical puzzles. The miners experiments numerous possible way to solve the puzzles and when the best solution establishes the miner who found it declare to all the others in the network (Nakamoto, 2008) then all the other miners check the declared solutions and if they found the solution is correct then they confirm it and update the block (The Economist, 2015). In the blockchain, the puzzles are simple to check. In return, the miners who solve the puzzle is rewarded with a certain amount of minded bitcoin (The Economist, 2015). This incentive drives many miners to solve the mathematical puzzles, and the payment or reward is paid after the specific amount of block is mined. Here the payment is also controlled by the smart contract which is also a feature of blockchain technology, another reward system is adding transaction fee with the transaction and most of the transaction is includes a transaction fees through the transaction fee is very low compared to the traditional banking system.

3.3 Existence of Blockchain Technology in Industries

Many companies are adopting the technology, it can be categorized as a public and private ledger, public ledgers are entirely open, and anyone from the network can join in that where a private blockchain requires an invitation and needs validation by the administrator. The private networks restrict and controls who can participate and based on the transaction and security level. Despite being developed for financial records, blockchain can store any data technically. France's Carrefour retailer uses blockchain technology to track their food supply chain, Storj uses it to facilitate a decentralized cloud storage network, and California - based ObEN uses it to develop its artificial intelligence ecosystem. Blockchain, however, is just a high - tech ledger system at its heart, though one that can streamline and secure all transactions drastically. The real
value of blockchain technology, according to Yuan, lies in its ability to facilitate digital currencies such as bitcoin, which can enable businesses to attract users and compete better against established players in the industry.

The mission of CyberMiles is to democratize and decentralize e-commerce through the creation of a collaborative network of buyers and sellers, without going through large players such as Walmart and Amazon, charging hefty fees. To do this, it has developed its blockchain network to manage common issues in peer-to-peer trading and e-commerce transactions, and to help multiple users reach agreements by using what the company calls smart business contracts. CyberMiles also developed CyberMiles Token, its digital currency, to provide an efficient in-work settlement currency to reduce transaction costs. We cannot use the same blockchain for all-purpose that needs to modify based on the service category.

3.4 Business Impact of Blockchain Technology’s

According to (Block chain’s Occam Problem) Blockchain is emerging and will change the business technology and this technology is operating for the last 09 years but have not marked any remarkable impact other than accounting and transaction. There is more than 100 blockchain case found in financial, arts and healthcare sector and range of application from registration of land to smart contracts but in the most cases, it used to store information removing all third party. Over 2017 the investment in blockchain startup reached over One billion and big tech giants like IBM, Google is working on this for the last few years. Blockchain payment cryptocurrency Ripple is increasing and partnering with a lot of non-bank payment providers.

According to Mickinsky, there are few distinct categories where blockchain is already used; those are mainly categorized into two types based on purpose: one is record keeping, and other is transactions. For the record keeping purpose aims to the static registry which mainly used for storing reference data and the type of service available right now are the land title, patent data, food safety and origin based data. The identity aims to distributed database identity-related issues this mainly used due to an extensive set of identity-specific use cases such as identity card, civil-registry, pooling. Moreover, smart contracts used for a set of conditions triggered automated self-
executing actions such as insurance claim, new music release. On the other hand, some use blockchain for registry of tradeable information that includes dynamic registry where assets are exchanged on a digital platform, for example, drug supply chain. For cross-border payment, insurance payment claim blockchain is using for efficient payment infrastructure, and finally, there are some other issues like ICO. This is some business cases where blockchain is already in use.

3.5 Potential of Blockchain Technology in Smart City arena

There have been many reasons for using this technology. In the short term, the primary purpose of using this technology is cost reduction as this technology is focused on operational efficiency. To optimize the blockchain strategy based on the market situation companies needs to develop strategies based on target use cases. The optimal strategic approach to blockchain fundamentally depends on the several markets for example market dominance where it defines the ability to influence the major parties, on the other hand, standardized and regulatory barriers.

Decentralized file storage on the internet gives more protection from getting hacked. Blockchain can help the content owner to protect the copyrights through the smart contract. Blockchain can make manage the IoT devices through a smart contract to make changes under a specific circumstance (Christidis, Devetsikiotis 2016). It can be done under specific circumstance a combination of software, sensors, network facilities and exchange the data through object and mechanisms. The result increases system efficiency and improves cost monitoring. Blockchain technology also can also help to manage the microgrids (Mengelkamp, Gärttner, Rock, Kessler, Orsini, Weinhardt 2018). It mainly helps when solar panel makes excess energy smart contract can distribute this automatically. Blockchain can also manage the anti-money laundering (AML) having proper know your customer (KYC). Now a financial institution must perform a multi-step process for a new customer. KYC cost could be reduced by cross-institution client verification and monitoring the transactions. Open and distributed open ledger made blockchain more efficient to maintain all kind of record-keeping. Few countries took this block land registration projects. Nordic nation Sweden is also experimenting with blockchain to maintain the property titles.
Transparency in Governance also could be attainable with blockchain technology by using the distributed ledger technology by making the election or poll taking result publicly accessible. A smart contract can help to make this. It can also apply to organizations to manage digital currency or accessible information among stakeholders. Blockchain can also contribute to the supply chain process by providing the origination to step by step process from manufacturing to end user level (Kim, Laskowski 2018). This supply chain process also can verify the product or service we use is original or authentic by checking the backstories. Here all the parties can check back the backstories of the product and ensure the data about the product.

Blockchain has potential in security management especially in digital infrastructure, protection for probable economic losses, cyber threats. There has few cyber-attack for where those companies used centralized ledger system, and cyber specialist believes that could be mitigated if these organizations used a distributed ledger system. Blockchain breaks traditional security system and creates a more transparent and secure system based on cryptographic data structure and as those data are distributed and cyber attackers are not able to destroy the data which makes the data more secure as a platform.

Blockchain can provide supply chain logistics service, it secure and transparent transaction monitoring. This facilitates not only real-time monitoring but also time travel from the past. It can monitor cost at the individual level, labor cost at each point of the supply chain. This unique distributed ledger enables the source of the product from the origin to end user. This has revolutionized the shipping industry and one of notable shipping company Maersk maintaining cargo using this technology. This technology can access the data and secure the scheduled delivery.

This technology also saves time, and several costs also reduced using it. The traditional system requires the check back and audit the data wherewith blockchain we do not require the data to be audited as the task is automated, the settlements and reconciliation are more straightforward and efficient this saves time and reduces the cost. This technology also reduces the cost of networking by using the distributed ledger. The cryptocurrency is also reducing the cost and time to do a transaction with any parts of the world within minutes. Many companies including IBM using this
technology for its financing firm for contract issues among customers and partners. This technology enables to, and view of transaction maintaining the confidentiality and only relevant parties can access the data.

Some key features make blockchain such a significant advancement in technology. Some of these bring the value visible from the short term period and some of those visible from or scaleable in the long term period. It increases the security as the entire system is decentralized and the data stored in thousands of different servers instead of to a centralized location which made there is no single point of failure. The proof of the work is verified with others, and all the nodes use hash algorithms that ensure the transaction and valid. The data stored in the digital ledger which eliminates the paperwork and make the information easily accessible also the data unalterable so no one can mislead the actual information. Here all the transaction is time stamped so it can be verified in real time and eradicate the fraud.

3.6 Limitation of Blockchain technology:

From the beginning of blockchain has struggled its lawless image, back in 2011-2012 bitcoin was used to buy hot commodities on the internet. However, it has not designed for such illegal transaction the unacquainted public still recognize bitcoins association with the cryptocurrency black-market. This unfortunate truth stained the image of the blockchain. There have been some other issues that graved the people’s negative attention towards it; there was a Ponzi scheme named Bitconnect used for lending service. That bit connect went worth USD Two billion from USD 9200 then shut down without informing some significant investors. There was another scam on the name of BTG where nearly 30,000 people scammed out of USD 50 Million by a scammer, and they pretend as the investment management company. Moreover, there were few Initial Coin offering scams took where they took time to build legitimate websites, with fake employee profiles to make their presence in the website, and after the investment, those company got vanished and took the invested amount. Those situations created a volatile situation, and as a result, many investors do not feel safe to invest in this market. So many crypto investors are not into the investment into the project; instead, they prefer to buy and sell the cryptocurrency to make money out of it.
Most of the people do not have proper concept blockchain and some of the Misconception still believed by many scholars; some people believe that it is bitcoin while bitcoin is one cryptocurrency application of blockchain and this technology can be used for much other application. Another misconception about blockchain is considered as a better database than traditional database while blockchain comes with the essential idea of the distributed ledger where it has promises secured and an open ledger which is much more secure than traditional ledger, and it is valuable in a low-trust environment. Some people considered it immutable or tamper-proof, but in reality, it can be tempered if more than 50% of the network computing power is controlled and all the previous transaction are rewritten. Some people also consider it is 100% secure, but in reality, the security of the system depends on the adjacent applications.

Mckinsey also addressed blockchain problem as Occam's problem, Occam’s razor is also called as Law of parsimony, where it means simple solutions are more likely to be correct than a complex solution. Blockchain could not be made their solution simple for the last one decade, and many people working in the financial sector believe this technology is too early to use or the business ecosystem is ready to adopt this technology. Blockchain’s practical value remains mainly in three areas, and those are Niche application where there are some cases where blockchain technology is suited to i.g, insurance, capital market. Modernization value where many industries use blockchain as a tool to support their ambition for example in the shipping contract, payment application, etc.

Finally, many companies use blockchain for reputational values to get a competitive advantage ahead of their competitors; for example, IoT networking can make many companies ahead of their competitors. Many believe that the concept of blockchain is not understood clearly. It may face challenges if government decisions are decentralized. There is some security concern for blockchain technology in case of smaller networks where validation depends on the voting can be obvious potential for fraudulent activity. Another could be advanced in quantum computing where a quantum computer is ten million times faster than any personal computing system and can effortlessly hack codes and make crypto transaction authorize. Therefore many validation processes need to be replaced and updated within a few years. Mckinsey
analysis found out three critical insights on the strategic value of blockchain. Those are; 1) Blockchain does not need to be disintermediated in order to generate values, it mainly encourages commercial applications that are allowed, 2) Blockchain's short-term value will be reduced before a transformative business model is created, 3) Blockchain is still few years away from feasibility, because the difficulty of resolving the competition paradox to establish common standards.
4 BUSINESS MODEL

In this chapter, the concept of the business model, the origin of the concept, how the concept developed and some business model will be demonstrated. The business model concept can minimize the gap between abstract thinking and practice (Teece 2010) & (Richardson 2008). The business model is a concept of realizing business opportunities and give a framework for implementation (George, Bock 2011).

4.1 Business Model Origin

This dynamic topic has been a commonly discussed topic since for the last few decades, but there is no historical evidence from when exactly this concept came into limelight though many scientific articles argue that this topic is in rising after the dot-com bubble (Amit & Zott 2001, Timmers 1998). The dot-com bubble was an economic bubble and extreme speculation from the period 1995-2000, and during that time many companies emerged for the extreme growth for adaptation of the internet. More especially during the mid-1990s, the term became a buzzword in the business practice when the business industries are shifting from the traditional business to electronic business (Baden-Fuller, Morgan 2010). The force of entering into the digital economy made the companies to this challenge which made them act more quickly and act on it (Ghaziani, Ventresca 2005) and to adapt this challenge startup became more useful to use and could adapt business model and start competing with established firms those startup started this on the international level (Jetter, Satzger, Neus 2009).

4.2 Origin of Business Model Research

According to Bellman, Clark, Craft, Malcolm, Ricciardi (1957) the scientific research paper of Business Model was published in 1957 but the concept of the business model rather young in the field of Business Research. As I already discussed earlier that the business model concept came into limelight after the dot-com bubble and the shift of the business model is because of companies moved from traditional business to internet based business which is mentioned as competitive digital landscape (Bettis, Hitt 1995). If we see some of the major employers from the 1950-1960s period we will see some of the major industries are mainly related in the field of goods and service
producing companies such as General Motors, Bell System (currently the AT&T), General Electric but in the 2005-2010 the major industries or major employers changed to mainly service-oriented businesses such as Walmart, Kelly, IBM which gives a clear idea of the moving from entirely manufacturing industry to a service-oriented industry. Thus researchers became more interested in this buzzword. Scientific research emerged as existing knowledge is not enough to solve a new problem (Bunge 1967) and the business model research topic became famous for the dot-com boom. Due to the dot-com boom, the companies not focused on any particular business model and they were not focused into any promising revenue to the source to attract the investors (Teece 2010) their primary focus to bring any internet based business model to be strategically well in place. This over-enthusiastic approach made everyone to invest his or her time and money into developing a new business model which made them into this burst, and according to Magretta 2002, there was nothing wrong with the business model concept the impractical usage of the concept. Therefore many researcher and scholar were got interested more about the business model concept as some companies could not manage to survive, but some venture was way successful during that period (Dubosson-Torbay, Osterwalder, Pigneur 2002).

4.3 Defining Business Model

The business Model term has turned into one of a keyword in the modern business for the last few decades (Zott, Amit, and Massa, 2011; Onetti et al., 2012). Though many authors (Zott, Amit and Massa, 2010; Shafer, Smith and Linder; 2005; Onetti, Zucchella, Jones and McDougall-Covin, 2012) says, business model literature has not reached to its comprehensive definition what business model meant to be. Many authors came up with a different definition of the Business model according to there phenomenon (Zott et al. 2010). Most of the researchers used Electronic Business role in the organization, strategic issues and innovation management (Zott et al. 2010).

Many researchers discussed different components of the Business model (Morris, chindehutte, & Allen 2005) gave a perspective of Business Model components, here I added some more component in addition to that;
<table>
<thead>
<tr>
<th>Sources</th>
<th>Specific Components</th>
<th>Number</th>
<th>E-Commerce / General</th>
<th>Empirical support (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horowitz (1996)</td>
<td>Price, product, distribution, organizational characteristics, and technology</td>
<td>5</td>
<td>G</td>
<td>N</td>
</tr>
<tr>
<td>Viscio and Pasternak (1996)</td>
<td>Global core, governance, business units, services, and linkages</td>
<td>5</td>
<td>G</td>
<td>N</td>
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<tr>
<td>Timmers (1998)</td>
<td>Product/service/information flow architecture, business actors and roles, actor benefits, revenue sources, and marketing strategy</td>
<td>5</td>
<td>E</td>
<td>Y</td>
</tr>
<tr>
<td>Donath (1999)</td>
<td>Customer understanding, marketing tactics, corporate governance, and intranet/extranet capabilities</td>
<td>5</td>
<td>E</td>
<td>N</td>
</tr>
<tr>
<td>Gordijn et al. (2001)</td>
<td>Actors, market segments, value offering, value activity, stakeholder network, value interfaces, value ports, and value exchanges</td>
<td>8</td>
<td>E</td>
<td>N</td>
</tr>
<tr>
<td>Linder and Cantrell (2001)</td>
<td>Pricing model, revenue model, channel model, commerce process model, Internet-enabled commerce relationship, organizational form, and value proposition</td>
<td>8</td>
<td>G</td>
<td>Y</td>
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<tr>
<td>Chesbrough and Rosenbaum (2000)</td>
<td>Value proposition, target markets, internal value chain structure, cost structure and profit model, value network, and competitive strategy</td>
<td>6</td>
<td>G</td>
<td>Y</td>
</tr>
<tr>
<td>Gartner (2003)</td>
<td>Market offering, competencies, core technology investments, and bottom line</td>
<td>4</td>
<td>E</td>
<td>N</td>
</tr>
<tr>
<td>Hamel (2001)</td>
<td>Core strategy, strategic resources, value network, and customer interface</td>
<td>4</td>
<td>G</td>
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<tr>
<td>Petrovic et al. (2001)</td>
<td>Value model, resource model, production model, customer relations model, revenue model, capital model, and market model</td>
<td>7</td>
<td>E</td>
<td>N</td>
</tr>
<tr>
<td>Dubosson-Torbay et al. (2001)</td>
<td>Products, customer relationship, infrastructure and network of partners, and financial aspects</td>
<td>4</td>
<td>E</td>
<td>Y</td>
</tr>
<tr>
<td>Afuah and Tucci (2001)</td>
<td>Customer value, scope, price, revenue, connected activities, implementation, capabilities, and sustainability</td>
<td>8</td>
<td>E</td>
<td>N</td>
</tr>
<tr>
<td>Weill and Vitale (2001)</td>
<td>Strategic objectives, value proposition, revenue sources, success factors, channels, core competencies, customer segments, and IT infrastructure</td>
<td>8</td>
<td>E</td>
<td>Y</td>
</tr>
<tr>
<td>Applegate (2001)</td>
<td>Concept, capabilities, and value</td>
<td>3</td>
<td>G</td>
<td>N</td>
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<tr>
<td>Amit and Zott (2001)</td>
<td>Transaction content, transaction structure, and transaction governance</td>
<td>4</td>
<td>E</td>
<td>Y</td>
</tr>
<tr>
<td>Alt and Zimmerman (2001)</td>
<td>Mission, structure, processes, revenues, legalities, and technology</td>
<td>6</td>
<td>E</td>
<td>N</td>
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<tr>
<td>Rayport and Jaworski (2001)</td>
<td>Value cluster, market space offering, resource system, and financial model</td>
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<td>E</td>
<td>Y</td>
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<tr>
<td>Betz (2002)</td>
<td>Resources, sales, profits, and capital</td>
<td>4</td>
<td>G</td>
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<td>Author(s)</td>
<td>Components</td>
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<tr>
<td>Forzi (2002)</td>
<td>Product design, revenue stream, output model, marketing, financial, network and information</td>
<td>6</td>
<td>G</td>
<td>Y</td>
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<tr>
<td>Osterwalder and Pigneur (2010)</td>
<td>Value Proposition, target customer, channel, customer relations, revenue stream, key resources, key activities, key partnerships, cost structure</td>
<td>9</td>
<td>G</td>
<td>Y</td>
</tr>
<tr>
<td>Ash Maurya (2012)</td>
<td>problem, unique value proposition, solution, channels, key Metrics, unfair advantage, customer segments, cost structure and revenue streams</td>
<td>9</td>
<td>G</td>
<td>-</td>
</tr>
<tr>
<td>Ahokangas’s</td>
<td>business opportunities and value proposition need to base on market conditions and market opportunity where he mainly focused on three questions What, Why and How.</td>
<td>3</td>
<td>G</td>
<td>Y</td>
</tr>
</tbody>
</table>

**4.4 Components of Business Model**

Shafer, Smith, Linder (2005) gathered components from Business Model literature and shaped an illustration where most of the primary components has been presented. They classified the components in four main categories; strategic choices, the value network, creating value and capturing the value and those components they captured from twelve publications from 1998-2002. They defined the business model with their diagram and used those four components as a basis of their business model definition. They used four keys terms to define their business model, and the first term is core logic deal with fundamental assumption and cause and effect relationships. Second term strategic choice deal with the internal consistency, the value create term deals with the firms competency and positional advancement which can make them different from competitors and finally the term value network deals with network a firm need to maintain over the period of time to keep the business or service at a flow (Shafer, Smith, Linder 2005). They also identify few problems of their definition those are flawed assumptions underlying core logic, limitations in strategic choice, misunderstanding about value creation and capture and finally flawed assumption about the value network.
4.5 Usages of Business Model

Alt and Zimmermann (2001) gave an insight of the purpose of Business Model, where they discussed three important attributes as firstly the current business model, and this helps for background study as well analysis purpose. It can also use as type model to describe the business models and finally it can be used as a simulation to demonstrate the company showing different possible orientation in the future. This concept can be a favorite tool for the start-ups this can also be used in the applied business as well, this tool can be useful during company’s lifecycle as it can be used at any time of the business life cycle as one company’s lifecycle can be divided into pre-seed, foundation and operation and finally the decline stage. It can also be used in the different stage of product or service lifecycle, and each stage of the lifecycle is more like the lifecycle of a company those are development, introduction, growth, and maturity, and decline stage.

The popularity of the Business model is growing as this is very simple to use, this uses straightforward visualization tools to understand the value creation and value capture of the firm (Ahokangas, Matinmikko, Atkova, Minervini, Yrjölä, Mustonen 2016). This is can proper communication tools that can be used for planning the business operation and this can also be used to clarify the value proposition and value creation.
for the stakeholders (Baden-Fuller, Morgan 2010). This model also can be used for showing how attractive the business concerning economic means (Baden-Fuller, Morgan 2010) and this also can be used for estimating the cost and revenue margin of a venture (Chesbrough, Rosenbloom 2002). The business model tool can be used as a guideline for the organization’s operation including a sequence of action need to done (Baden-Fuller, Morgan 2010). According to Baden-Fuller and Morgan (2010), the company can operate several business models at the same time. The business model always seeks to improve the overall firm’s performance and emphasize on the collaboration with related partners (Kotzab, Teller 2003). The business model itself can be used in any business, and it provides a holistic view of a company at any period the company and gives an overview of the company. The business model also discusses the factors that not in the company border. All the components of the Business model are the interdependent component.

4.6 Business Modelling Tools

Many authors have defined the business model concept on different context; some of the authors have focused on the general business perspective while others have proposed on the e-commerce perspective. Most of the authors have specified some components from their perspective and supported by empirical evidence. Horowitz (1996) proposed the business model based on five specific components and those are Price, product, distribution, organizational, characteristics, and technology which is focused on the general business perspective while Hamel (2001) proposed business model on the Core strategy, strategic resources, value network, and customer interface components. All of those came from the perspective — business model canvas and lean canvas model in popularity among the startup community.

Urbanization is expected to grow faster in the coming years. In 1970s time around 60% of the population lives in the metropolitan areas, and this number now grew at 80% of the population. Smart technology will help cities sustain growth and improve the quality of life of citizens. Scholars agree that long gone are the days when a single business model could help sustain a company for longer profitability (Morris et al. 2005, Ahokangas et al. 2014).
4.6.1 Business Model Bridge:

Gary Hamel in 2000 explained different components of the business model through the business model bridge (appendix). This model is alienated into four individual parts, and those are customer interface, core strategy, strategic resources, and value network. The first part explained the relationship with the customers as Customer interface included fulfillment and support, information and insight, relationship dynamics, pricing structure. Product and business goals mainly demonstrated in the core strategy part where it includes Business Mission, Product/Market scope and the basis for differentiation. In the third part, the critical resources are explained by the strategic resource part, and it includes core competencies, strategic assets, core processes. In the final part, the external relationship with the firm explained through the value network part which includes Suppliers, Partners, and Coalitions. This model based on the efficient, unique, fit, profit boosters where these four parts are connected and create and connection by customer’s benefits, configuration and company boundaries.

4.6.2 Business Model Canvas:

Osterwalder and Pigueur (2009) came up with an idea of in the Book titled “Business Model Generation” where they created a conceptualization tool called Canvas. It consists of nine building block (Figure 14) which are utilized in the current business environment as well during the period of making a business from the simple idea. Nenonen and Storbacka (2009) demonstrated out of these nine blocks five blocks from the right side; value proposition, customer segments, channels, customer relationship, revenue streams are directly linked to accelerating the customer sales, marketing, and revenue while the left side four blocks of vital resources, key activities, essential partnership, cost structure are linked with company performance as well as overall operational expenditure.

Value proposition: This building block describes the service or product offers to meet the need of its customer and this unique value proposition distinguish its self from other competitors (Osterwalder & Pigneur, 2005). In order to satisfy the customer and
making money out of it the company continuously improve the existing product or offer something better than its competitor. Here it mainly deals with the value they offer to their customers also dealing with the weather the customer needs to be fulfilled and what is the unique value that no one is offering.

Customer Segments: This building block help companies to identify who is benefited from the products or service offered by the company. The main concern of this segmentation is to understand who the actual customer and how to serve them and make them into a loyal customer. This segmentation also helps to find the potential customers and ways to attract them and based on the segmentation the companies make a proper channel to reach out them. Another concern for this segmentation is to find out which customers are bringing money for them. This business model also identifies who are paying customers and who are ready to pay for goods of the business (Chesbrough, 2010). This can also demonstrate for whom they are creating value and who are the most valuable customers.

Channels: This building block explains the ways to reach out to the target customers or consumer in order to serve the value propositions. These channels include several phases: purchase, selling medium, delivery, after-sales service. Here to reach to a customer is the primary target and to find out the most cost-efficient way is the primary target.

Customer relationship: This block explains the type of relationship the company wants to build with their customer segments and how to maintain this relationship to a long run so that the company can make more profit as well to serve the value.

Revenue Streams: The revenue stream blocks describe the ways to make money form target customers from all the segment of customers. This Revenue can be generated from the selling product, providing the service, usages fee, subscription fees.

Key Resources: This building blocks demonstrated the primary resources that a firm needs to create to fulfill the customers need. This resources can be physical, intangible, and financial.
Key activities: This activity in the building block describes the activities needed to obtain the value proposition. This block says the importance of offering a value proposition, purchasing, selling, customer’s relation and to earn money.

Key Partnership: This building block explains a cooperative agreement between parties that can help in the business operation. This block is needed in order to reduce the risks and uncertainty of a business model. Here all the related parties are included like an alliance and joint ventures.

Cost Structure: This building blocks demonstrate the financial consequences during the business operation. This cost can be obtained from creating and delivering value, maintaining customer relationships and generating revenue.

Figure 14: Business Model Canvas

<table>
<thead>
<tr>
<th><strong>Key Partnerships</strong></th>
<th><strong>Key Activities</strong></th>
<th><strong>Value Proposition</strong></th>
<th><strong>Customer Relationships</strong></th>
<th><strong>Customer Segments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative agreement between parties that can help in the business model or leverage</td>
<td>Arrangement of activities</td>
<td>Product of services that create value of the customers</td>
<td>Relationship with customers</td>
<td>Customers whom a company wants to offer value to</td>
</tr>
<tr>
<td><strong>Key Resources</strong></td>
<td><strong>Channels</strong></td>
<td><strong>Cost Structure</strong></td>
<td><strong>Revenue Streams</strong></td>
<td></td>
</tr>
<tr>
<td>Resources required for repeatable pattern of actions</td>
<td>Interacting with customers and delivering value</td>
<td>Representation of money in all the means of business model</td>
<td>Mechanism to capturing value</td>
<td></td>
</tr>
</tbody>
</table>

*Business Model Canvas (Adapted from Osterwalder & Pigneur 2010)*

### 4.6.3 Business Model Wheel

Though the study of Osterwalder’s Business Model Canvas was based on nine specific components and he does not consider the factors regarding the Business Opportunities and Ahokangas analyze the Business Model Wheel which adopted from Business
Model Canvas and considering the Business Model Canvas (Ahokangas, Matinmikko, Yrjölä, & Kivimäki, 2014). A Business opportunity can be seen as the heart of the business model (Ahokangas, Matinmikko, Atkova, Minervini, Yrjölä, Mustonen 2016). To exploit the opportunities is one of the primary function of the business model (Ahokangas, Matinmikko, Atkova, Minervini, Yrjölä, Mustonen 2016).

The business model needs to efficient and effective as well differentiated if the business builds competitive advantage upon opportunities. Petri initially made this for the mobile network operator, and this Business Model Wheel was created for business opportunities for an enterprise. This model has three necessary asking to demonstrate more about a business model of company those questions are: What companies are offering to their customers in terms of value proposition and product and service, how they are planning or offering the service in practice and why the company think they can make it with profit (Ahokangas, Juntunen, & Myllykoski, 2013). Apart from these three significant questions, there are few elements of the Business concept were used to answer those questions. The first question ‘What’ includes product or service offering, value proposition, customers segments. This represents the keys values and product that a firm offer uniquely to its customers. ‘How’ elements include the area of business operations, making a market for the product including selling and delivering to customers. It deals with the hard works done by the company so that the Business activity make a profit. ‘Why’ elements include a base of pricing, cost fundamentals, cost drivers, costing techniques which explain the profitability of the business functions. Finally, ‘Where’ elements mainly includes location or activity of the items, it can be done both internally and externally as well as the location or the perspective of the item. This ‘Where’ mainly helps in all the other elements to indicate the activities is to done by internally or externally.

This tool recognizes the business opportunities expires with the time and need to renew the business model by finding new opportunities; it makes it a transformative and dynamic tool. Ahokangas et al.’s (2014) state that the value proposition must be based on market conditions and business opportunities. On this point this model is different from the business model canvas is static and ignores changes that may happen in the market condition. On the other hand, the business model canvas often focuses on the
value proposition, and sometimes entrepreneurs articulate the value proposition based on the internal decision instead of the market demand and conditions.

The business model wheel gives an action-oriented business model. It helps to consider most of the changes that a market may have and the way opportunities changes over the period. This model recommends the organization to reconsider the core business opportunities to remain profitable and competitive. This also makes sure they still have business opportunities by discovering them. Otherwise, companies need to find new or alternative opportunities to build a new business model around them.

Table 4: Business model wheel

<table>
<thead>
<tr>
<th>What?</th>
<th>How?</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Type of Customer</td>
<td>- Sales &amp; Marketing Approach</td>
<td>- Basis of pricing</td>
</tr>
<tr>
<td>- Offering</td>
<td>- Mode of Delivery</td>
<td>- Cost element</td>
</tr>
<tr>
<td>- Value Proposition</td>
<td>- Competitive advantage</td>
<td>- Ways of charging</td>
</tr>
<tr>
<td>- Differentiation of identities</td>
<td>- Key operation</td>
<td>- Identification of critical costs</td>
</tr>
</tbody>
</table>

*Business Model Canvas (Adapted from Ahokangas et. al 2014)*

4.7 Blockchain Business Model

New technology is a source of a new business model. Many companies are using a different level of the business model depending on the company type, size of the market, targeted customers. Here we can talk about a few companies that
revolutionized the business model for the last couple of decades; In the case of the blockchain, it is creating a similar type of industry.

Table 5: Business model some notable company

<table>
<thead>
<tr>
<th>Company</th>
<th>Business Model Area</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon</td>
<td>Retail business model Innovation</td>
<td>E-commerce technology</td>
</tr>
<tr>
<td>Airbnb</td>
<td>Hotel Business model Innovation</td>
<td>Sharing economy (Accommodation)</td>
</tr>
<tr>
<td>Facebook</td>
<td>Social Media Business Model Innovation</td>
<td>Could Industry</td>
</tr>
<tr>
<td>Google</td>
<td>Search engine business model</td>
<td>Cloud-based algorithms</td>
</tr>
<tr>
<td>Uber</td>
<td>Shared Taxi Business Model Innovation</td>
<td>Sharing Economy (Ride Sharing)</td>
</tr>
<tr>
<td>Wikipedia</td>
<td>Encyclopedia Business model</td>
<td>Open source technology</td>
</tr>
</tbody>
</table>

There is an apparent conflict of interest between the traditional business model and blockchain business model where the goal of the traditional business model is to serve the best return or profit to the investment to the investor while serving the best product to the customer. While in the blockchain business model is a more holistic business model where the investor aligned with the users and developers. The traditional business model has put the customers and shareholders in the situation that the customer wants the best product and shareholder wants the highest ROI which can be eradicated through the blockchain business model. It created an enabling some interaction and removing intermediaries as it creating a trusted system. As there no shareholders and board of directors, their business model will be different from the traditional system. The business model of blockchain is more like the business model of the internet and more like an operating business model as it decentralizes the overall functions. With the development of blockchain technology the blockchain business model is also on the rise.

Decentralization has changed the way how we see problems around us and how we solve them. There have been many business opportunities there, and the business model for each of those varies based on the nature of the business. Organizations can turn their business into a platform of decentralization with blockchain that can change the way their business works. It changes entities, transaction flows, profits, and also ensures growth is maintained throughout the change. Since the inception of bitcoin, there have been many cases where blockchain failed the reasons have always been how it utilized — most of the time it is not the technology but the flawed business model by the companies. There should be a blockchain based business model that focuses on how the business works and the benefits of the end users. The traditional
business model is more like a centralized business model and concentrated on four main entities including shareholders, organization, customers, and employees.

Blockchain business model is not similar to the traditional business model, it is decentralized where it removes the third party between two people, so there is not entities and no shareholder. It is not owned or controlled by anyone who will make it look more lucrative for the end users. One very important way to make money is using tokens, the person who helps in the blockchain agreement rewarded with tokens and those tokens have a specific value. Bitcoin also offers miners the chance to make a profit by the contribution to the network. Those mining Bitcoin have a value determined in the ICO. The value of those ICO’s depends on many factors like business condition, valuation, current market scenarios, etc. Crowdfunding is another way to invest in the business and a better chance to make money. During the ICO stage, the price of the crypto assets become low, and developers can acquire funding to do their project into reality. Now there have been many business models based on blockchain.

The business model of a utility token is established in the industry. This business model gives a utility service better than the current one and charge based on the improved service. This token utility has three variables like role, features, and purpose. Now there have been many startups; e-commerce is using this utility business model. Ripple is a perfect example using this business model as it powers the network activities and using much more improved service then swift to transact money from one bank to another. They make the profit when the value of that particular utility changes. This token-based business model is also known as “tokenomics.” Blockchain as a service model is another popular one; this provides an ecosystem for other businesses to manage their blockchain. Currently, many companies are offering such services to other companies to manage their business on the decentralized operation. Microsoft has their Blockchain wing named Azure, IBM has Bluemix to other companies, and those companies and startups do not need to know how the system works. For example, Ethereum is using as quick contract service by many companies provided by Microsoft and these companies does not have any ideas how it works background but they are using this as a service platform.
The blockchain concept is almost ten years older, but many big companies have not used the blockchain service. However, with the rise of the service, those big players need to use it and the most convenient way to use it either to buy a blockchain solution or integrate a current blockchain solution. Many early developers using this software developer technique as a business model since they are in upfront of developing the service and have extensive research on the topic. For example, Spotify now using blockchain service developed by MediaChain to resolve the royalty issues within the music industry which bring transparency in the reward system of the original content creator. Also, there is a lack of talent in the market in this area so big corporation wants to incorporate the service instead develop this one.

Providing blockchain based professional service is another business model using by many technology consultant and companies. They provide services to companies; startups want to be associated with blockchain service. Those companies have leading experts or consultants who can develop the service. Here those experts can give customized service for the blockchain project. It is a successful business model using by many companies like IBM, Deloitte. There some other companies they have an expert for a particular area provide service for that specific area such as contracts, auditing.

The blockchain is still under the development phase. A lot of startups and companies are solving this problem uniquely. Many companies are now developing apps that can be managed by blockchain and cloud-based data storage. Few companies are already supporting this kind of service that gives a development platform to provide such tools, guidelines for blockchain development. Those are the existing business model in the blockchain area; those model can be changed based on the company nature and service model.
5 DATA AND RESEARCH METHOD

The qualitative researches need to be done in open-minded to find the result and use those in a suitable area. The qualitative research needs to find the balance between the analysis and the exploring materials to mention the difference in theory and the empirical data essential to mention. This chapter will present the plan to reach to research objective; this can be considered as a diagram of the study to which will answer the first and subsequent research questions. This chapter will start with explaining the research methods and the methods of data collection and technique to be used in the data analysis. Here the chosen data is based on the contents, data quality, data collection method and making the data adjustments. This will ensure the transparency of the research and those are well defined and follow a process flow that the data can be utilized once again for further studies. The mentioned framework of smart city services and blockchain enabled business model has been used in the collection of empirical data which will continue to interpret the data. The chosen research method also described well for the reader's point of view so that they can understand the whole content easily. In the final section, the research design as a logic ensures this the research coherence is justified. Qualitative researches need comprehensive data collection and make it in a realistic situation.

5.1 The Research Method

This research study is focused on the probable business model for blockchain enabled smart city services. This requires a series of continuous action and that from the synchronization from the public and private sector on the city organization perspective. From the city perspective welfare of the citizen are the primary concern, and they study mostly focusing on the futures; thus this research will choose one of the widely used future research methodologies. This method will enable the researchers to identify the plausible future from the data analysis from theoretical and empirical parts. This research method chapter will first focus on some widely used future studies then lead to describe in detail the chosen research method for this study. Those discussed methods have some advantage and disadvantage as well as the justification for the chosen method will also be presented here.
Future Studies: Future studies are known as futurology; this comprises of the study of possible, probable or preferable future and underlying the worldviews and myths. Future studies are considered a branch of social science and similar to the field of history. This study seeks to understand what is going to continue and what is likely to change. This study seeks to a systematic pattern-based understanding of past and present, and probable future events and trends will be determined. This study method can be compared to natural science or social science the comparison between sociology and economics. Future study is an interdisciplinary field that aggregates and analyzes the trends and possible future in a professional method. This analyzes the pattern, sources, reason to change and attempt in the develop foresight. This study method is referred to as future study, strategic foresight, futurology. Inayantullah (2008) discusses some basic concepts and fundamentals of the future. There are mainly six critical questions about the future when an individual addresses it. The individuals first ask what kind of future they are looking for, what are the fearful features of constructing future, what are the hidden assumptions of the futures, alternative futures, best alternative from the preferable futures and how to reach to that future. Those six points are a critical factor for the future.

The researchers are very keen in this study; there have been many factors that distinguish future studies from other studies most importantly three factors; the first one, future studies examine possible, plausible future trends and the role “wild card” can play future scenarios. Second, future studies typically attempt to explore the holistic or systematic view based on the different categories, for example, economic, social, environmental, political, etc. Finally, it challenges and assumes future views dominating and argumentative. The future studies do not deal with the short term prediction or forecastings like product lifecycle or interest rate over a period and strategic planning goals with time horizons between one to three year. Plan and strategies longer than the period aiming at future events which will connect the future scenarios from the past experiences are part of the field. This study mostly concerned with the transformative impact changes over the incremental changes considered as future studies. Foresight and forecasting enable managers the tool to search for alternative result in a similar condition or situation and many organizations do it in practice. There are two widely used term in management studies that mission, vision
and those are also focused on the future. On the following chapter, some of the widely used future study methods will be discussed along with the chosen research method.

**Future Study Methods:** Future study techniques or methodologies are considered for a framework to sense the data generated through a systematic process to think about the future (Maree, 2018). There is no single method suitable for all the future study method; different researcher came up with a different structured technique to study the future. There have been many methods to study the future; futurists mostly used some of those techniques to study the future; Delphi method, futures wheel, trend analysis, scenario methods, cross-impact analysis, causal layered analysis. Futurists use scenarios, possible alternative futures as a tool to study the future.

Glenn and Gordon in 2009 in Futures Research Methodology Version 3.0 discussed the future studies methods. Future studies and future research can be categories into two major group based on desired future and possible future those are known as normative and exploratory (Glenn, Gordon, 2009). Some of the most commonly used methods will be discussed below:

Delphi method is originated by Rand Corporation 1950s to develop a technique to get a strong consensus from an expert group (Dalkey, Helmer 1963). It is concentrating on standard communication technique or method for researchers for various points in their studies. This method is also used as a tool for executive decision making. This method is also known for methodical and interactive forecasting and identification in the early stage of any research (Okoli, Pawlowski 2004). At first, researchers can use Delphi Method to identify the variables and generates proposition secondly this study solicit the information is from experts thirdly this study ask reasoning from the experts on their opinion and finally, this study also contributes to constructing validity (Okoli, Pawlowski 2004).

Real-time Delphi method is another tool to study future, and this is an advanced form of Delphi method, and this method is developed in order to reduce the problems of Delphi Method such as real-time presentation of results, difficulties in to manage the progress of tasks (Gnatzy, Warth, Gracht, Darkow 2011). Real-time Delphi method does not use the subsequent round, and therefore this method improves the efficiency
of the process and minimize the time to perform the study (Gordon, Pease 2005). The number of participants from different studies undertaken to be small in size as well this method is applicable when the study is needed to be completed in short period, but it requires more time when the number of participants is more in number and enough time available (Gordon, Pease 2005).

Future Wheel method is a foresight method that identifies the consequences emerge a significant change in the future. It used a technique and named as mind-mapping. This method provides a model based on future on the consequence of an event or trend using a wheel and using two impacts one is primary and secondary, and the ripple continues until the implication, or the event is clear. All the participants encourage to come up with ideas, and only the significant consequences are reported (Glenn, Gordon, 2009).

Trend Impact Analysis is a simple forecasting approach to forecast the future, and this analysis uses expert opinion and deals with unique future events (Agamia, Atiyab, Saleh, El-Shishiny 2009). This quantitative analysis is based on the historical data or time series data to forecast the future but in the field of future studies both quantitative and qualitative data is needed and this analysis provides the hybrid method which combines both qualitative and quantitative data to forecast the future (Agami, Omran, Saleh, El-Shishiny 2008).

Cross Impact Analysis is another standard tool of the scenario technique to study the future, and it provides structured processes for the assumption of cognitive development of the future. This analysis used the require expert opinion and regular interaction (Weimer-Jehle 2006). This method also explores how events and variables can be related concerning events and how this qualitative approach makes the effect on with rest of all the event (Glenn, Gordon, 2009) and also shows how the relationship would impact events and reduce uncertainty in the future.

Those are some of the widely used research methods, but to reach the research objective causal layered analysis has been chosen. The following chapter will demonstrate this method and justification to chose also described in the following chapter.
**Causal layered analysis:** Casual Layered Analysis is methods for investigating what lies under the trends & events we are observing happening around us. This technique is used in strategic planning and study of the future to shape a better future. This analysis works by identifying different levels and attempts to create a new future by synchronized changes in all the level. Sohail Inayatullah, a Pakistani futures studies researcher, proposed this tool to analysis. CLA described as four levels or layers, and those are named as litany, system, worldview, and metaphor. This new method aims to seek empirical, interpretive, critical and action knowledge learning method. CLA method is not to predict the future but to create transformative spaces for alternative futures to be created. It is also useful in developing policies that are more effective – more in-depth, inclusive, longer-term. It has four levels: litany, systematic/social causes, worldview, and myth/metaphor. The challenge is to conduct research that moves up and down these analytical layers and therefore includes various ways of knowing. CLA begins and ends by challenging the future (Inayatullah, 2009). CLA method is using as a policy tool for governments, cities, NGOs, and associations. It has been used for local policies and strategies. For example; Policing, Health, Education, Information and Communication Technologies, Innovation, Aging, Transportation infrastructure planning, Sustainability, Industry and Trade, and New Product innovation or development.

**Layers of CLA:** CLA in horizontal has four levels the first one is the identification of the problem which states the problem statement, the second one the associated solution which identifies the solutions, the third level is who can be associated with the problem solver and in the final level source of information of problem which seeks to the solution textualized. This metaphorical dimension is included in the causal layered analysis and is linked to other levels of analysis. It takes the assumption that there are different levels of reality and different ways of knowing as its starting point. Causal layered analysis demands that we go beyond conventional problem framing. Regular academic analysis, for example, tends to stay with occasional forays into the third layer in the second layer, rarely using the fourth layer. Individuals, organizations, and civilizations see the world from various perspectives – horizontal and vertical. Consequently, causal layered analysis asks us to go beyond conventional problem framing. CLA does not focus on or epistemologically privilege articular level, although it indeed calls for depth analysis.
The first level is the "litany" usually presented by news media which means when the problem seems complicated enough, and the government needs to intervene to solve the problem, this type of problem often comes to the news headlines and the public has some personal responsibility to solve it, but mainly government solves it. This level deal with the quantitative trends, problems, often exaggerated, often used for political purposes. This type of problem has quantitative dimensions. There is no connection between events, issues, and trends and it appears discontinuous. The level of the litany is the most visible and apparent, requiring few analytical capabilities (Inayatullah, 2009).

The second level is a holistic approach deal with social causes that include economic, cultural, political and historical factors. Usually, this type of analysis is articulated by policy institutes and published in newspapers or not-quite academic journals as editorial pieces. This level excels in both technical and academic analysis explanations. At this level, the role of the state and other actors and interests are often explored. It deals with the relationship between multiple parts and depends on the causal variables. Most of the solution comes from civil society or the interaction with multiple institutions (Inayatullah, 2009).

The third level is a worldview, that is a deeper level that's the frame of analysis it requires an intense focus on the lineage of the problem statement. The task is to find deeper structures of society, language, and culture. The task is to find more profound social, linguistic and cultural structures that are invariant actors. The solution often in transformation, changing the worldview and rethinking politics of reality. The solution is long term action based and require the interaction of many variables (Inayatullah, 2009).

The fourth level is that the analytical layer is at the metaphor level. These are the in-depth stories, the common problem's unconscious and often emotional dimensions or the paradox. This level provides the worldview under investigation with an emotional level experience and looks for solutions that uncover the myth and visualize the alternative metaphors. This level often appears in the work of artists which visions of spiritualists and here the solution cannot be rationalized easily. Here less specific is the language used, more concerned with visual images, follow the heart rather than
exact figures. However, questioning itself finds its limits, as the questioning framework has to enter into other frameworks of understanding (Inayatullah, 2009).

Figure 15: Causal Layered Analysis

Causal Layered Analysis (Adapted from Inayatullah 2003)

Regular academic analysis, for example, tends to stay with occasional forays into the third layer in the second layer, rarely using the fourth layer. CLA does not focus on or epistemologically privilege a particular level, although it indeed calls for depth analysis. We can integrate analysis and synthesis by moving up and down layers, and we can integrate discourses, knowledge ways and worldviews horizontally, thereby enhancing the wealth of analysis. However, in vertical space, CLA orders the scenarios. Therefore, at each level, scenarios are different. Scenarios of litany type are more instrumental, scenarios of social level are more policy-oriented, and scenarios of worldview attempt to capture fundamental differences. Scenarios of the type of myth/metaphor are equally discrete but articulate this difference using a poem, story, image or some other method of the right-brain. Finally, who usually solves the problem changes at each level as well. It is usually others at the litany level – the government or corporations. It is often a kind of partnership between different groups at the social level. There are people or voluntary associations at the worldview level, and they are
leaders or artists at the myth/metaphor. Thus, CLA has a factual basis, framed in history, and then contextualized in discourse or worldview, which is then located in myth and metaphor in pre- and post-rational ways of knowing. The challenge is to bring to a particular problem these many perspectives, to go up and down levels and sideways through different scenarios.

Table 6: CLA Analysis Table

<table>
<thead>
<tr>
<th>Level</th>
<th>Problem</th>
<th>Solution</th>
<th>Problem-Solver</th>
<th>Source-Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litany</td>
<td>Difficult to solve or easy to solve. Measuring depth is tough.</td>
<td>Short term approaches</td>
<td>Government</td>
<td>Newspaper, Television</td>
</tr>
<tr>
<td>Systematic</td>
<td>Problem because of short term historical factor</td>
<td>Systematic Solution</td>
<td>partnership among the sector of the society, government</td>
<td>Policy journals</td>
</tr>
<tr>
<td>Worldview</td>
<td>deep structure</td>
<td>Transform perceptions, change worldview, rethink self</td>
<td>Writers, philosophers</td>
<td>Ideological journals, philosophy journals</td>
</tr>
<tr>
<td>Myth and metaphor</td>
<td>Founded by core myth, or transcendent events.</td>
<td>Uncover myth and create processes to imagine alternative stories</td>
<td>collective unconscious guided by visionary leader</td>
<td>Works of artists, visionaries.</td>
</tr>
</tbody>
</table>

Application of CLA: This chapter will present some application of CLA. Those are mainly categorized into two types. This first category is analytical where this method will be used as a research framework. Another category is workshop based on where this method is used as interactive participation. CLA can be used as questioning the future, many companies and many managers use it in the practical cases for example in the General Electric company use this framework for action learning. Those managers are trained to question the product or process, but rarely to challenge their questioning's paradigmatic basis. Those questions are mainly problem oriented. This method improves efficiency by questioning the production, product or process. What are likely changes and how the change will happen in the possible future is the primary purpose of the method? This view avoids the deeper basis of the questions. The answer to the questions changed if it asked from the solution level. For example, in the litany level, we can ask future managers how many managers we need in two or three years from now? At a more profound level, the question might shift to what would be the skills and knowledge needed for those managers? In a more deeper level or
metaphorical level one might ask why and how we manage our organization and why we have managers at all, are there any other ways to organize? This type of futuristic views can change the ways to think and give the intuition to solve the work itself is simplistic, if not faulty.

CLA method is useful for City futures and in-depth communication. (Wright, 2002) David Wright has experimented the poststructural research and to a small town in Japan. David Wright tracked the conflict between the local government and people who are assuming the future and ordinary citizens. While the local government was explaining the decline of that city for the post-bubble economy and senior citizens, however, wright researched the issues, how the city could be reconstructed and came up with the issue related with the power which is centralized top-down who make the decisions for the future, in more deeper situation the language is a barrier and support this type of hierarchy. This makes it clear the city was needed a new economic plan than to blame the overall economic situation or age of the citizens in the long run.

Reasons to use this method in this research: CLA is one of the widely used forecasting methods which is not only concerned about particular predicting future but open up the space for dialogue which can be shaped as scenarios. Andy Hines and others from the Association of Professional Futurists commented that CLA is much more challenging to use in areas where the cultural corporate is homogeneous or where hegemony is strong. (World Futures Studies Federation, 2002). This research study is synthesized of three research areas from the business model, blockchain and smart city sector. As the goal of this studies is to discover new means of the future context and from the ideation to from short term to long basis as matches the requirements fitted with the CLA method. This method also can not foresee the exact future instead creates some preferable futures. This approach helps in many ways:

- To see a context in multiple levels (Litany, systematic, worldviews, myth)
- This method move and down multiple layers and implied future at each level.
- It expands also allows alternative scenarios and preferred future to emerge
- This helps to embrace different ways of knowing interests among participants, especially in the workshops.
- A broader range can use this method as this includes artistic expression in the future process.
- This method can direct the discussion from superficial or obvious to deeper and marginal.
- Transformative action by various actors and leads sustainable policy action to solve problems
- This method can help to make strategies for short, medium and long term.

CLA can categorize many different many perceptions and realities, and often individuals write from different perspective and CLA find space for all of them. CLA also gives strategic reasons to understand another level if active participation is on board and transformative. Finally, CLA, as it brings in inner layers — the presented official self, the self-systems, the self-dominant worldview, and the personal stories we tell ourselves, can challenge those who do not want to include the subjective in the objective world.

There are some limitations of the CLA method; it does not forecast the future by themselves; it is used with other methods such as analyzing and visioning. On the other hand its also new method many used it for the academic purpose, but the empirical case studies demonstrate CLA is more effective policy making yet to be completed. In case of workshops if the discussion does not fit into CLA categories Litany, Social causes, worldview, myth; thus we need to create categories by working with individuals. Despite those few limitations, this method helps to see how the future will be in a different time frame. The research topic also requires more empirical support as this study deals with all the essential elements like environment, governance, energy. These holistic issues need to simplify not only from the theoretical perspective but also require conceptual space to study. In the following chapter how the research was designed and collected the data has been analyzed.
5.2 Research Design

This chapter will demonstrate the research design in detail and chosen approach for this research. This chapter will focus on the empirical data of this study, the process of collecting the data from primary and secondary sources as well as ways to analyze those collected data. To reach the research objective, a researcher needs to follow the complete steps sequentially. A new horizon and more in-depth understanding of a problem or subject can be achievable by the process of scientific research (Kothari, 2004). The reliability of the scientific studies depends on the data collection process and method on research strategy. Those data implemented to analyze and interpret processed into result in order to get the research outcome. The chapter will also analyze the data while maintaining a line between steps towards results in order to solve the research question. The justification for the research approach will be presented throughout this chapter, and the following chapter will give a view of data analysis and discussion.

5.2.1 Qualitative vs Quantitative research Approach:

Most of the research approach is either a qualitative or quantitative approach. Qualitative researches tell the story of a particular experience in their point of view and those focused on interviewees personal judgment. The logic of qualitative research approach is a challenging approach for the researchers as those are from the perspective of the interviewed person. Most qualitative research uses the inductive approach whereby the researcher first collects data and then tries to derive explanations from the data. Qualitative research tends to be more exploratory, provide insight on how individuals understand the aspects of their worlds. This also focuses accomplishment of the result by discovering using various research technique, understating of reasons, as well the research motivation. It discovers the insight into the problem and helps to develop an idea or hypotheses.

Qualitative research deal with data from direct observation from fieldwork, extensive interviews, and written documents. Scientific research in nature depends solely on numerical data to achieve the result required by the statement of problems. On the other hand, some use the deductive approach in a while the researcher first looks at the
theory then collect the data and then validate the data. For this research study, we choose the inductive approach where the research started with a question then empirical data collected from different sources and supported by the theoretical framework constructed then reach to the research objective. This research approach takes the possible understanding which is derived from the data. The data hypotheses are formed after the data collection and initial analysis of data — the hypothesis of qualitative research point to the role of contextual factors that influence interest. The purpose of qualitative research is to provide detailed or specific situational experience. Well-designed research is highly systematic; this approach carefully records both observation and their experience in collecting data.

While on the other hand, in the quantitative research approach the researcher’s deals with specific hypotheses and collect the numerical data and number then empirically test them to reach the objective. Quantitative focuses on a systematic empirical investigation by numerical, mathematical data and using statistics. Quantitative analysis requires numeric information variables. This is a way of measuring a variable that has more many values. Quantitative data can be collected in various ways. Researchers can collect the data directly, or the research participant can gather data. Interview and questionnaires are commonly used to collect the data. The hypothesis for quantitative analysis is meant to be highly specific, describing a clear relationship between dependent and independent variables. The result from the quantitative analysis is reported in statistical graphs, and statistical models control variables included, presented and interpreted. Quantitative approaches are much more useful while using specific questions or targets. It also required accurate data, and this approach is complicated when the subject area is not studied correctly. This approach requires stronger empirical evidence than a qualitative approach. According to Orb et al. (2000) "Qualitative researchers conduct naturalistic investigations and study real-world settings inductively, in order to create a range of narrative description and case studies."

The title of the research question is based on three fundamental aspects, and two of those are smart city and blockchain, and both of those are concentrated on the future since those are not using in widespread, and on the other one is business model which also changes depending on the company nature, culture and period. This research will
choose to follow the qualitative approach, and Qualitative researchers argue that if researchers want to understand people’s motivations, their reasons, their actions and the context for their belief and action in an in-depth way qualitative research is the best. The qualitative approach is more descriptive where it explores and emphasize on the surrounding situation; this also helps to understand the people's experience, behaviors, critical variables. This perspective enables researchers to get insights by interpreting the experience of the individual in order to reach the objective.

Qualitative research much more critical in this research arena because the number tells only a part of the story. To measure the probable future people does not scale than in any numerical figure. The potential business model of the smart city also can be measured in number. The customer group needs to express themselves which can be only possible in the qualitative study. During the interview period, the interviewee needs to foresee and need time to think then they can express themselves which is very important in the future-oriented study. This approach will help us to identify the suitable data source, collection technique and we can structure them based on the data collection. In this research the size of the sample is relatively not so big, the interviewed persons are industry expert and researcher from the research related topic. Moreover, the title of the research subject matter cannot be quantifiable as the subject matter focuses on the future and the probable future cannot be quantified therefore we concentrated on the inductive qualitative approach for this research.

5.3 Research Strategy

The discussion the previous chapter focused on qualitative research methodology. The title of the research gives more reason to do qualitative research than a quantitative one. In the previous chapters the framework of the smart city, blockchain enabled smart city services and research methodology CLA has been discussed. The framework of a smart city also discuss to a deep level, and the context of blockchain enabled smart city service is presented in the previous chapters. The research strategy also defines the direction of the research and the flow from the research to answering the main research question and subsequent research questions in a sequential manner. In order to focus on different research strategies, Yin (1981) mentioned, “four different research strategies can be identified for qualitative research; they are the case study,
experiment, history & simulation.” Considering this fact, this study will collect the empirical data and based on those the research study will be a case study. However, this research will not focus on a single city organization or company’s case. This study will shape a case by gathering different stakeholders from different industries to get a holistic overview. The case study enables research in context-sensitive to learn deep phenomena.

On the other hand, this research study has few limitations since this is a future-oriented study and the market setting is challenging. Besides, qualitative case study the researcher can gather data from various sources to have a deep understanding of the topic (Dubois & Gadde 2002). There is no specific framework or standard to do qualitative case study; therefore, the researchers can formulate the suitable approach to analyze the relevant data to reach the research objectives using the case, creativity (Gummeson 2003). One of the main objectives of the research's data analysis procedure is to combine theoretical understanding with empirical findings in such a way that no misinterpretations are concluded.

As blockchain enabled smart city service is future-oriented are we are assuming the likely future analyzing the forecasting from the industry oriented specialist. The data collected from the interviewee are focused on the future and bridging from the present time. The researchers need to forecast specific issues considering the technological advancement at a steady pace. Some of those interviews also assuming based on their judgment; therefore all the data may not be fitted on the actual research question. The researcher also emphasis on both theoretical concept based on the secondary sources including comparing with few countries who are using this structure. The nature of qualitative research to put more importance over empirical data for in-depth understanding and features. All limitations and challenges were embraced during the conduct of this research study. Although it is mentioned that, if it considers too many or critical limitations that directly impact the results of the research findings, the reliability and validity of any research may be questioned. In the following chapter of discussion and conclusions, the limitations of this study and how this study ensured its reliability and validity were discussed from the scientific point of view. Following this research study, the following chapter would discuss deep insights into the case study methodology.
5.4 Data Collection and Analysis Method

As mentioned the research divided the smart city framework into six individual categories, and the focus is to collect the empirical data from some of those related categories. This subchapter will demonstrate that the data collection and analysis method logic will be discussed. Data collection is a systematic way to collect and measure the necessary information from many sources to acquire the data for study or research purpose. Those data sources are known as primary data and secondary data. Primary data refers to the factual information or materials collected from the direct sources by the researchers for example interviews, survey, observations. Secondary data are those primarily collected by other people for their research purpose (Ghauri & Gronhang 2005). Secondary sources including books, academic journals, articles, online data are used. The secondary data is considered as initially primary data for their research or study purpose, and those data need to use care in the research paper. Sometimes the data collected for one purpose or one study than using it for another research is also known as secondary data. Sometimes researchers use the third party data sources due to unavailability of the data. Those data sources can be reports, books, articles, census.

There is numerous data collection technique used in qualitative research. Observation, market research, field research are most common. Researchers may choose the sample of the observation without revealing the purpose, or revealing the purpose to the study group. Researchers can also take on the role of participant observer, participate in the observation process and the record the observation data and take action in the interpretations. The data collected through observations are carefully recorded that researchers make decisions after each observation; this observation includes a description, impressions, quotes, and aspect of the interviewed person. Some of those interviews are conducted by researchers to get their perspective on those specific issues. Those interviews can highly structured, semi-structured or free-flowing like a conversation. Most of the interviews recorded then transcribed to make sure the exact information, focus point, emotions. Some researcher also prefers to take notes instead of audio recording. In-depth interviews are useful to collect the perspective of individuals while some researchers prefer to do focus group interviews to know how the group of similar individuals understand a particular issue. Focus
group interviews enable to interact with one another for shared narratives, and this is also recorded then transcribed to capture the exact language used by the group. Content analysis is another category of qualitative research; some researcher prefers it as this can take almost any form for example written documents, audio, video materials. This form of research take the unspoken assumptions that give meaning in the social world.

Researchers mainly take both primary and secondary data into consideration based on the nature of the study, objective of the research. Most of the researchers use both primary and secondary sources data. There have been two types of data sources used for this thesis. The first interviewing the sector related specialist personnel and other one is secondary sources from the academic journal, organizational records collected for other research purposes. In this study the primary data collected through the direct interview from a sector-based specialist from BusinessOulu and OulunEnergia from the industry side and from the research arena the researcher interviewed researcher from the University of Oulu who are researching on the business model, smart city, healthcare, business ecosystem arena. This research work synthesis from both from the industry side and from the research side as well. The interview was focused on the sector's specialist for example for the smart mobility, and smart energy the interviewee was the responsible person the City of Oulu, who have the clear vision of the city organizations plan as well from the industry plan.

During those interviews, we discussed the potential of smart city initiative in the short term, mid-term and long term future. We also discussed the potentials of blockchain enabled smart city services comparing the traditional city services. The discussion started from the current city services to city service in the future and how can we encounter the probable problems in the city services in the short term and long term future. We also discussed the business model in general then explored the business model in the long run for the city services and city associated organizations. This is to be mentioned that, the interviewees also very interested in the subject topic as blockchain is a hype in recent time, and the smart city is the future. We also discussed the elements of the business model in general and how they are changing over time including customer behavior, the customer in general and how they are changing over time from short term to long term future.
Primary data collection method; interviews: To reach the answers to questions such as why, what and how, where the interview is considered one of the best ways. The interview is a purposeful conversation between two or more people that requires the interviewer to establish a relationship and to ask concise and unambiguous questions that the interviewee is willing to answer and listen carefully (Saunders et al. 2009). It can, therefore, be assumed that straightforward questions can be asked through interviews to gather a clear understanding of the facts and to explore the nature of the considerations furthermore reliably and validly (Saunders et al. 2009) has provided three different types of interviews: 1) Structured, 2) Semi-Structured, 3) Un-structured interviews.

Structured interviews are more organized, this usage pre-arranged and the same set of questions where the interviewers administered the questionnaire process. Such a process is conducted with each interviewee following a similar pattern as the interviewees ask the questions by reading out loud and then recording the answers or answers to the questions precisely to the questions asked. This process starts some basic questions about the introducing with the interviewer and interviewee, and the interviewers explain the whole process of interview with some underlying reason behind the interview and up to what extent those data will be utilized. The structured interviews are mostly utilized in descriptive studies. This is more applicable when the respondent does not have much time to fill the questionnaire, and in surveys, the researcher seeks to find more opinion-based answers.

Semi-structured interviews are comparatively open-ended, and here the respondent can express from their point of view. In most of the cases interviewer ask some questions and open the discussion in the process of interview. During the interview, the respondent shares their views and ask for some specific information’s. The question might change a little bit based depending on the topic area considering the social and environmental context. The outcome of those interviews and sharing specific from the respondent’s point of view. This interview approach also follows the recording of the interviews for further analysis.
The unstructured interviews are more like open-ended questions, and interviewee and interviewer are more informal and focus on exploratory research studies. This kind of interview is often done for more general purpose, and interviewer and interviewee explore and a general topic. Depending on the nature of the interview the interviewer can give the unstructured interview into more informal and can interview more like a conversation. Here both get the freedom to talk reading an event, experience, beliefs which will be recorded and analyze for further processing. From the above and based on research topic the semi-structured interview would be fitted for this research, as the topic seeks to study and foresee the future and requires the respondent's opinion from his point of view — the research based on external perspective and interview data insights. To understand the smart city business model, its necessary to obtain the data from city associated organizations and researchers point of view, apart from the primary data collected from the primary sources we used the available secondary data. Most of the company related data collected from the annual report, company website, previous case studies, news portals available on the open sources. Those secondary data extracted then summarized under the thesis requirement. Those selected data are related to smart city initiatives, business model, and those are serving for both private and public sector.

There were three face-to-face interviews from a researchers point of view which focused on the ongoing research perspective and current scenario in the smart city, business model and blockchain arena. Two of them are related to smart city iniatives and business model arena; they are also responsible for individual projects of Oulu city organization. Another of one is from the research arena who are researching for the smart energy, smart city, business model arena the researcher is from the University of Oulu. Summary of those interviews are presented below:

Table 7: Interview conducted for this research:

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Role in the Organization</th>
<th>Specialized area</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH</td>
<td>Project Manager of Business Oulu</td>
<td>Digitalization of City Organization</td>
</tr>
<tr>
<td>MR</td>
<td>Head of Unit, Oulun Energy</td>
<td>Smart Mobility, Smart Energy</td>
</tr>
<tr>
<td>YX</td>
<td>Doctoral candidate &amp; Resercher, University of Oulu</td>
<td>Business model, Smart Energy, Smart city</td>
</tr>
</tbody>
</table>
Each of those interviewees is chosen based on the research topic and recommendation from the thesis supervisor. Each of those interviews took around 50-60 minutes to cover the discussion in-depth. One interview was done over the phone due to his unavailability in town. As the objective of this study is finding the potentials business model for the blockchain enabled smart city services the framework of the interviews also structured in such a way. The study also tries to study the future customer group, sales, and marketing, business opportunities activity based on the empirical data as those also related to the future business model. The interviews also focused on the short term, medium term, and long term future. Here the term is short term denotes five years periods, the medium term for ten years period and long term denotes fifteen years period.

All those interviewees contacted by email to confirm the schedule and provided with introductory notes about the topic: the interviewers also gave an introduction about the thesis topic and description of the timeframe and how the study is being conducted. This is to mention that, this information does not make any effect on the respondents' outcome. Those interviews are recorded with the consent of interviewees for transcription and further research purpose. Those interviews started with the concept of Smart city, the framework of the smart city, blockchain technology and how the blockchain can disrupt in the blockchain enabled smart city services. We also discussed the business model with the light of mentioned time frame for short, medium and long term future.

Method of data analysis is a further step in this study. In this stage, the process depends on the nature of the study. In the data procedure, there are many steps including a collection of data, examination, classification, testing, and validation of the study (Yin, 2003). Preferred strategy to analyze the data is following the theoretical assumptions for the research objective, and in this study, the theoretical assumptions have a long term effect, therefore, to reach the primary and secondary research questions are the best way do that research. This research will use some direct quotes from the interviewers since their opinion is utilizing in the research scenarios. Those scenarios were designed based on the interview outcome, and the researchers focus on the detailed discussion and combining those discussions from those interviews into the constructed scenario. The research methodology is used to analyze the interview
outcome and creating future on the timeframe for the city organization. The analysis of those interviews and the constructed scenarios will provide the scenarios of business model elements and their change in the time frame. CLA will provide us not just to present those business model elements but to dig deeper how those elements will change over the period.

To continue with the process, the next chapter will construct the future from the interview outcome and discusses the changes in Business model elements in the timeframe, which will help to answer the research question.
6 FINDINGS AND DATA ANALYSIS

This chapter displays data collection, data reflection, and rational discussion. This chapter will demonstrate that the potential future of blockchain enables smart city services in Finland and the influence of blockchain over the business model elements. The empirical data collected on a similar theme to get the context from a different perspective. The data collected in a way so that the data covered the business model elements in a different timeframe. The whole discussion is based on primary and secondary research questions. The study used the most important business model elements from Business Model Wheel and Business Model Canvas tool. Finally, the impact of blockchain over business model elements has been discovered. A smart city is a future to accommodate the migrant from the rural area. This is not because of any particular purpose but as for overall service scenario. What kind of smart city we will have in the future it depends on the nature and structure of that particular city. Many cities are already playing some role in smart cities, and those activities meant to facilitating the citizens. From the researcher's point of views, YX mentioned there are many kinds of smart cities and it depends on many requirements. Big cities and smaller cities all are trying to incorporate the smart way of doing things and that for the benefits of the citizens.

“...different kind of smart cities can emerge in the future; different segments are coming together. However, I feel it's kind of difficult to redefine what smart city is because different cities have different need and requirements and they have different profiles. There are big cities like Paris and smaller cities like Oulu. So I think it depends on the profile or background of the cities. They have a different kind of needs my feeling, and smart cities are most meaningful if they bring the benefit to the people.”

The city organization will focus on offering many services that are related to technology and sustainability. The service could be from two different perspectives; one could be from the city organization perspective, and another focusing on citizens perspective. From the city perspective, the smart city focuses on the long term sustainable action and from the citizens perspective the maximum benefit from the city. The empirical evidence also shows the validity.
“...from the smart city perspective technology needs to be implemented. There different type of technology and different need to technology platform will emerge in the future. This kind of new service, they will be offered by the city organization for the benefit of the citizens”

6.1 Future of Business model

The primary data collected from the Industry experts and researcher from Finland keeping in mind of the study topic business model of blockchain enabled smart city services. The data collected in a similar theme of linear progressive future. Here the short term future period is one to five years, middle term future is five to ten years, and the long term future is for ten to more than fifteen years.

6.1.1 Short term Future

Blockchain is emerging, and it has potential is the smart city service area. This may require a long time. This subchapter will show the probable changes in the short term future. Cities are becoming the epicenter for art, culture, technology, and creating a new range of economic activity. Over the period, this will grow geometrically, in the short term the study will show the probable changes in from 1-5 years of period. As mentioned earlier, there are many blockchains enabled smart city services are in practice; some of those need to be much more mature. According to YX in the future blockchain will be fitted in many smart city services. In the theoretical framework, we have seen the technology is using in some parts of the world. To implement blockchain service in all the areas of smart city framework is not easy, but somehow those will disrupt. Regarding the blockchain disruption in the smart city, arena YX mentioned;

“Yes, it not just in the future. It is happening today in some countries. There is an actual implementation in some specific segments, for example, blockchain for the energy. So in some place, there are some projects or technical implementation so they can connect the blockchain with the smart city services. Though those are not on a huge scale, it is going to be in the future.”
In the case of solar energy, blockchain technology is proven, and the service has been integrated into the practices, for example, this is now used in the roads, residential use purposes as well. To make it effective for smart grid technology, blockchain technology is already in use by several companies in Finland. But this is still on a smaller scale, this technology needs to be mature to use it in the public sector. Many startups are now trying to create such a platform to serve the city in a better way.

The pricing model in some sector changing rapidly depending on the service and availability. The pricing model is becoming more consumer-centric. For example, if we compare the pricing model of ride-sharing service (uber, lyft) with standard taxi service, we can see the difference. The pricing model will change in the short term future for many industries, and this continues to happen.

The customer segments are also changing over time, this going to continue more in the short term future. Now many companies are focusing more on the niche market. For example in the car rental service, In the city of Oulu, there is a new company named Carden which offer to rent a car on an hourly basis from the locality. Considering the social aspect that the company offering a more specific value proposition. The identification of this kind of niche target market continues to grow more. For the last few years, the service delivery is changing rapidly, social networking also has been significantly changed. The concept of staying connected has been a social practice that changed in the recent past. People are adopting digital services much more than in past years. Many services are now improving fast and enabling companies to offer more digital service from the education sector to health sector everywhere companies and people are offering more digital services.

Managing data is another crucial element to use from the resident, vehicles, and the rest of the city infrastructure. In the short term future, that city organization and vendors will solve the needs of the citizens. The concept of smart city efforts is more likely to focus on the newest technology, many companies will focus on solving the needs of citizens in the short term future. The concept itself to the citizen and for the citizens. In the lens of smart cities, it solves like the phrase “lead with the need” thus to engage the community and ensuring the effort of smart cities as the resident's needs.
Blockchain enabled smart city services to have a promising future in the smart city are but the technology is not mature yet for the short term future. In the public administration is very important to introduce the technology that matured and sustainable for the long run and blockchain has yet to prove in this short term future. YX also mentioned the technology has a promising impact and already used in certain areas but to use it in all the segment of the smart city is still need further development. This technology is consumed a lot of resources.

“...in the short term, I do think it is challenging because Blockchain has both positive and negative side. Blockchain is not a mature technology, so there is a lot to be developed.” YX

Economic and social conditions are pre requiring for a smart city, and Finland is mature compared to some other parts of the world. Here the near cent percentage of people are using the internet also digital platforms when is come to the question of education, mobility, governance comparing to other locations of the world where technological advancement is not that much to offer service as we have in Finland. The short term future of the blockchain enables smart cities are not entirely in operation in, but some of its services are already in practice. Finland needs much more this kind of smart cities as many peoples tend to migrate in cities from comparing to smaller cities and villages.

### 6.1.2 Medium term future

Blockchain enabled smart city services to have potential in the medium term future. The business network will change from the B2C to B2B as many city organization will focus on incorporating more organizations to serve for the companies. For example, in the case of the energy sector, the service will decentralize to many companies and services from different sector to a different company. Many companies, including startups, will be a focus on the business solutions of smart city services. Many companies will focus on outsourcing their product or services, for example, one big company will outsource its small functions to many companies; thus the operational efficiency-optimized at the best level. Sales, marketing, and human resources cost continue to increase, and many companies will outsource those activities to third
companies. We can see in recent time many companies are outsourcing that activity to other companies which are specially designed for this kind of functions. In the case of human resources, many companies are working to find suitable employees for other companies.

There the operation cost will also increase a lot, and in almost all, the sector will focus on operational efficiency and it will have a direct correlation with the pricing model. The pricing model will also continue to change from the previous era. The pricing model will be more open and transparent to the consumer level. There will be many companies who will price their product at a premium price and many companies who will try to grave the attention of mass people by providing in compare to the low price. The pricing method will be much more apparent to the customer level based on service level and quality. For both cases, there will be a consumer to buy their product/service.

International business will be affected by many global regulations as well as much stronger protocols in the CSR. More companies will act to work in a way that does not have any adverse effect on society or environment and this will be done either by regulations or for their CSR. This has a clear indication to change the business view of energy and environment-related businesses. In the medium term, people will be much more responsive to environmental issues. There will be more IoT devices for collecting people's data. Proper integration of all those data will ensure citizens life to its highest level, and the blockchain enables smart city services will be more matured in the mid-term future.

In the middle term period, it is expected that there will be many cities which are interdependent on one another. In Finland, there are six big cities which are running a project to become a smart city form the traditional one, which means the activity of one city is somehow dependent on another one, which will work like an organization where all the departments are dependent on the other one. Many small scale cities need the same attention but facing scarcity of resources. In such a case, the smaller cities can replicate some of the initiatives from proven smart cities as most of the city face similar types of problems. Development of Artificial intelligence will play a vital role here. As mentioned earlier the data collection and deploying service will be faster than before. In the short term, smart cities were focused into a collection of data, but in the
middle term future, the data will process through automated service like Artificial Intelligence and that will enable to take some decision based on the AI-based analysis.

The public and private sector will be much more diverse, and they will encourage small and medium business to integrate into the service layer. Small and medium business plays a vital role as their operation cost is low compared to public or large organizations. This will give a shift and engage small and medium businesses in the city infrastructure. In the sales and marketing concept is changing rapidly with the taste or human as well in the context of market demand and conditions. Most of the marketing channels replaced by some other channels. This is not only happening for companies; now many cities also changed the way and attracted citizens to choose that city. From the empirical data HH from Business Oulu mentioned in the response of the changing the sales and marketing approach with the pace of businesses right now;

“Right now many cities of Finland are on Twitter and other social media platforms to interact with citizens. They have systematic projects and focus on increasing visibility. That is the same thing, from a different angle for as a city organization.”

In the mid-term future, Blockchain enabled cryptocurrencies may come and replace the traditional currency system in many areas or for some specific industries. Here city organization may encourage citizen to use those Blockchain based currencies, for example, to pay with cryptocurrency in the smart mobility arena. They can use this currency to pay the taxi services, the cost of parking by the smart application. From the empirical data RM from Oulun Energia thing to such idea implementation may work but will take time and validation.

“Blockchain can offer this kind of service, for example, the payment of taxi service, traffic, parking cost.”

6.1.3 Long Term Future

In the long run, we will have a much better idea of how the business operates and how it is working. There will be many opportunities or technology for the smart city associated services that will evolve in the future. There will be better working
ecosystem and value proposition offered by the companies to provide the citizen with better service. There will be many companies who will work in the city development perspective and will offer better city services. As we have seen many human resource activity and sales and marketing activity will be done by the city associated organization which will work to minimize the cost in the long run. There will be many big companies like Google, IBM will offer services for smart cities, for example, in the case of cloud computing or city services. Already many companies or startups are working in this area. Many countries are focusing on the future, and the potential future will aim to much more environment-friendly. In the long run, if there will not be any initiatives which cant be measured that will not come into practice. For example, any initiative if that cannot solve a problem or create an additional value while doing a particular solution will not be granted. This indicates that any pilot project needs to have a purpose of solving. Which means there will be fewer projects but those projected expected to have a more significant impact on the life of city dwellers. This will include an initiative for more public, private partnership.

Innovation will go more in-depth and into cities and solve the problems in a cost-effective to save money. The framework of smart cities demands a higher investment but for a more extended period that considered as an investment which will save money as the whole system is interactive and interdependent on one another. Social changes are also essential elements that are related to the sales are marketing approaches changing every few years. This has an impact on society and may be in the middle term future it will change a more different than they are now. HH from the Business Oulu acknowledges the same view. He mentioned in response to how social changes make an impact on the sales and marketing of an organization.

“People are changing, and citizens are changing all the time, their value is changing. Now people follow a trend more quickly. So definitely this has an impact.”

The city business model will also change compare to the short and medium-term future. The future business model will be much more citizen-centric and focus on the future. Data privacy and data security should be another critical aspect to concentrate
on. HH mentioned the importance of digitalization to ensure better service from the city organizations.

“...we need to utilize the digitalization, better-focused services for our citizens and optimize the services. The city needs to ensure its citizens.”

Though blockchain is yet to mark its strong footprint in the technological area, many companies are still interested in incorporating the blockchain technology and they are focusing on the long term future. Many companies associated with city organization will use this as this is different from the traditional technology and take the benefits of this technology. From the empirical data, YX think the blockchain will have a prospective future as many companies will use this.

“...blockchain is different from traditional technology and it is adding new value or benefit, many companies will incorporate this.”

City organization will use this contextual basis. For example smart contract where blockchain is contributing, but there are ways to make a smart contract without this technology but the security is the value added to this where city organization will be interested to incorporate it. This depends on the implementation cases.

“Blockchain helps in the smart contract, but smart contracts do not have to be blockchain or similar kind of technology. It depends on the use cases; people try to evaluate what is the easy option that we can use also form the implementation perspective”. YX

To transform from traditional cities to a smart city require to analyze the future on CLA level. Where a city authority can predict the future and can take the measuring steps, from the empirical data from RM also believe this type of activities should take place to see Oulu as a smart city.

“...Oulu should take the step to open the discussion and start planning of the service. This is also a way to involve new companies and new ideas to have full-service offering based on the background information.”
Through the lens of researchers, this technology has a prospect both in research and in the implementation arena, it may take time to provide the full-fledged services. It will come up with different perspective in a different timeframe. Maybe in the value of the short term future is far way different than the value of the long term future. So we need to understand this technology well at the same time we need to take the use cases and look for the areas where it can be fitted.

“However, we are looking at the future. Its always good to remain positive or optimistic because Blockchain does have some advantage, as mentioned before. It is better than traditional technology, and they need to be developed. So people learn more and in the benefit of Blockchain.”

6.2 Business Model Elements

A comprehensive analysis of various business model elements will be presented in this section. As mentioned before, the study primarily used the Business model wheel developed by Ahokangas (2014). In this chapter with we will analyze the three significant elements of the business model wheel; what, how, and why. This study also used some elements of the business model canvas. For the business model of blockchain enabled smart city services, from the empirical data, there has been a mixed opinion. From the empirical data, some identified there should be some changes in the business model, on the other hand, some believe this is just another added value services for an organization which considered as a block or business model. HH of businessoulu mention the city business model need to be changed for smart city sector, and here blockchain could be used as a useful tool to use. He also mentions the importance of the legal aspect.

“The business model needs to be changed anyway. Moreover, Blockchain is one of the tools that could solve the thing.”

On the other hand, RM of Oulun Energia thinks a business model is a contemporary tool for which depends on the individual company. Some company is focused on environmentally friendly energy; on the other hand, some companies are not prioritizing environmental issues. Their customer group is not the same, and the value
proposition is different. This makes their business model different too. Similarly, in
the smart mobility area, RM believes that people in the future will be more interested
in having the service as a whole. The smart city will provide such services in the future.

“Business model depends on the service, for example, in the smart
mobility the all the elements of transportation can be under the same
platform, this kind holistic thing will be different from the traditional.
This can be provided by the blockchain technology.”

From the researcher's point of view, YX still believes that Blockchain is depended on
the use cases and how people use the Blockchain as service. Some use cases use
Blockchain used for the database, and some use cases they used it for enabling
transparency and shared things. This depends on the use cases.

“Blockchain can be used as another simple database or transaction
database where we see typical database today. If so, then Blockchain
will not be able to change the business model. if Blockchain can enable
transparency, more open, and sharing then it will be different business
model, transaction, infrastructure.”

Blockchain can only enable or bring new business model once it uses for the cases of
more sharing more open and uses this technology to ensure more transparency.
Otherwise, it may use like another technology. Maybe in some domain, it has its strong
footprint but in not all the domains of smart city framework. This technology needs to
prove to the decision makers that it has a business value on it. YX also mentioned that
blockchain might have specific values, and they need to show the business value to the
decision makers instead to make it technically.

What Elements

The business model wheel asks about the customer group, customer segments, value
proposition, in the literature part, there was a discussion about this. In this subchapter,
we will discuss the future of this in the short term, middle term, and long term future.
Customer Group: The customer group will change in the future, no matter the technology or service design we choose. If we take the case of smart cities, it will change too as the people are becoming more open and cities are more citizen-centric. Most of the cities are also focused on adopting the service technology, as repeatedly mentioned in the previous chapter, cities are adopting the technology which will open the new horizon to from the citizen's point of view. Using the data and cities now can categories the customer group. HH of Business mentioned the most of cities are now focusing on the dimensions and defining the service model.

“...the city has an excellent service for the citizens. The market is going more like vertical dimension on the other cities” HH

The policy is one more crucial issues from the city and citizens point of view. As city organizations are more policy is driven, and the structure is more like top to down. In future blockchain can take the decision based on the distributed network. The citizen can share their opinion through the network, and citizen can take the initiative to contribute to decision making. In the current scenario, citizens are not actively participating in any decision making. However, in the future, they will contribute to their own decision making through public pooling or opinion. Maybe they can not make decisions in all the aspects but most of the areas. From the researcher's point of view, YX also believes people will have more to say when this kind of technology will take place.

"...from the city perspective, this is a policy driven. The City council are a little bit like top down. Now citizen does not have the power or to make a decision. So, it is a bit futuristic, but this kind of emerging segments that people have more to say. "YX

Value proposition and offering: The value proposition of smart cities is the value promised to be delivered to the citizens. It has a two-sided perspective, one from the city point of view, and the citizen's point of view. It is also crucial for citizens how the value is delivered, experienced, and acquired. This value proposition can be for one specific purpose or the entire process of product or services. Implementation of the smart city will ensure the citizens higher value to the citizens. The framework of smart
cities itself meant to increase the transparency, increase security, and blockchain here can add value in the data management for the city level and individual level as well.

Managing the data of city organization is very crucial in both individual levels as well and city level. City organization sometimes manage highly sensitive data, and here blockchain can ensure data security. HH of Business Oulu mentioned the data management technique would be the change in coming years and city organization will be much more careful in managing those data.

"data management in the city level and at the individual level will change in the coming years. Insecurity data ownership, you can manage your data." HH

Blockchain enabled smart city services will also help to simplify the transaction process and in saving transaction costs. There have been many cases where blockchain can manage the save transaction cost and time; one possible source can be to manage in paying the parking fees in the city area. Usually, there are services to look for the free parking areas and pay the amount manually but in the blockchain enabled assisted parking service the application can redirect to the available parking areas with payment option in via cryptocurrencies. This will not only help the citizens but also enable service in a much more secure way.

This service technology is also adding value to the energy market in saving the transaction cost and recording the energy data. Energy is a sophisticated industry where it deals with many regulations so the process of implementing the blockchain technology could be slower than as usual. YX mentioned that in the city organization, the disruption might be a bit slower, not the way that it will come and disrupt in a way that changes everything. It may come in a slow and steady process may initially start with saving transaction cost by enabling the cryptocurrency payment then some other area like supporting the citizens in a much more secured and transparent way.

"...saving transaction cost and blockchain could probably help to simplify the process of the energy market. It is not happening that easy because energy is a relatively close industry where there is a lot of regulations and lot of big
players who are not willing to bring changes and such changes are happening at a slower speed, not like the disruption.”

The blockchain enabled smart city services is a complex framework, and to enable it to all the sector simultaneously is not possible. Therefore most the interviewed person suggested it to figure out the solution or focusing on the solution areas. It needs to be, and this is a comparatively new technology, and it can not solve all the problem, but we need to take the successful use cases.

“BC needs to find the right channel to figure out the solution. Probably this on the citizen-centric. I do not believe Blockchain alone can solve everything” HH

How Elements

Blockchain-based smart city services can reduce city functions. HH of BusinessOulu also agrees on the point of blockchain technology can increase the transparency in the city service and reduce in loss related the privacy and probable losses.

“Of course, we need to use blockchain based Smart city services, and we have to use it wisely. It can reduce city functions. It creates new ways to utilize the data.”

It is predicted that the civil service would be data-driven, to measure the success of a city there should be a quantitative measure. So many cities are putting effort into getting the data and for being active. Once they put effort on the data, their citizen support will become more dependent on analyzing the success of these programs.

Marketing and Sales: From the empirical data, we have seen that comparatively smaller cities will face some problem as predicted that in the future, there will be fewer taxpayers. Cities will face the Financial crisis, and this will help lead to lack of fund to facilitate the current citizens. So cities are now focusing on both issues supporting citizens as well as making money to run it in the long run. Previously many city
organization faced problems when they consider only facilitating the citizens. In the smart city area, the concept of the city will be self-sufficient by itself.

“cities are now focusing on this more, and it has to start from customer thinking, citizen thinking.” HH

In the future, Cities will become more open, and private, and cities are encouraging innovations to take place. Previously the cities are more traditional, centralized, and top to the bottom structure, but if cities are not interested in the innovation, they will remain the same. RM of Oulunenergia mentioned may be in the new future the city structure will not change much, but if we consider in the long run, we need to consider these issues. Cities in the future will be more open and innovative. Cities will compete with other cities to attract more citizens in their cities.

“... the city will be more open and private, from the example the city structure now is more traditional, centralized and liberalized and it will change in the future”.

**Key resources and Operation:** For the last few decades, cities are now focusing on sustainability and serving the citizens in the long run. HH mentioned the importance of utilizing the existing resources for the citizens' benefit. City organization will focus on how to make the existing platform into a blockchain enabled smart city service platform. RM also believes that in future cities will be much more private and citizen-centric where the city will use the existing resources to make it a much more capable platform.

“the city needs to optimize the existing resources for the citizens benefit so that in the future smart city could have the existing resources.”

There have been many changes happening right now in terms of communication. AI messaging is taking the place of standard messaging and email. City organization associated organization may introduce this technology and serve the customers in a much better way. Chatbot messaging can save the resources of city organization as
most of the time, customer support or citizens supports are repeating the same answer and help the citizens with the same issues.

**Competitive advantage:** This subchapter will discuss the concern elements of why some companies are again an advantage over other companies. This is also applicable to blockchain enabled smart cities too. In this study, the author identifies reasons how city service with blockchain technology get an advantage over traditional cities. All of those stages are dependent on the entire framework we discussed in the earlier chapters. Blockchain enables smart cities to have competitive advantages over traditional cities in terms of financial transactions. Blockchain can enable city services to pay or receive payment in much more faster and secure ways. RM already mentioned taking the parking payment by cryptocurrencies. Smart cities can introduce crypto payments in any city programs, welfare, and payroll related issues. This will enable them to make the transaction in much more faster ways. Blockchain enabled smart city service also provide identity management in much more productive ways. The decentralized identity management tool provides secure mechanisms for storing and validating user identity and reduces identity thefts and related frauds, which make them unique compared to traditional cities.

Blockchain enables smart contract can be used for the citizen's rights and identification. This will enable smart cities to have transparency over voting, citizens right, tax, and ownership of assets. This smart contract will also enable them to remove the paper and save time in the more extended period.

Smart energy is another essential service element where blockchain can enable citizens to have the energy in P2P basis. This will remove any middle man in the platform and enables any individuals to buy sell or transfer the energy. This will enable a good citizen experience and give them a competitive advantage over other cities. Cities in the short, mid, and long term will focus on attracting the citizens and companies to choose those, and this will give them higher revenue to serve the citizens in a much better way. HH of Business Oulu also mentioned there had been many companies who are serving for the cities and private customers as well those companies need to be more careful with the roles to both parties.
“...different kind of segment, business area and the company associated with city services are; basically, they have to play the roles with the city and citizens.” HH

Why Elements

In this subchapter, the author will discuss the basis or pricing the cost element and how those will make an impact on the business model. This chapter will also discuss how the cost element will change in the future in terms of the smart city area. Besides all those how the pricing model may change in the future is another crucial element.

Basis of pricing: For organizations like cities, they care about mostly citizens and hardly thinks about business practice. In previous they mostly care about covering the target costs but to serve the citizen in much more better they are now caring about the long term future, where cities will be much more citizen-centric, and sustainable city service are seen. HH also discussed this that cities in the past mostly concentrated on covering the cost, and still they are putting this on priority. The city organization has some cost, including administrative and associated costs. The pricing of city services is mainly based on the service level.

“For smart cities, I do not think the core will be running a business practice. It is covering the targeting cost. It is still the principle I believe, and the pricing is based on the use of service.” HH

In the city of Oulu, some associated city organizations are serving the citizens as well in the private sector. They are making money out the there service, but their profit target is at a marginal level after covering the costs associated with the service. City organization gives them a profit target and areas to serve the citizens. They set the pricing model based on the service they are offering.

“...in Oulu, we have many companies in the city like Oulun Energia, Oulun satama and they made their individual decisions. They have a profit target; it is not like zero profit expectations.” HH
Cost Elements: In this subchapter, we will discuss the cost elements and their structure. Digitalization will be a new tool for smart cities. According to HH of BusinessOulu mentioned, we could not stop other services to make sure blockchain will work. We need to incorporate the new technology with the previous one. There will be a cost associated with digitalization and transformation. The initial cost of the digitalization may be higher, but in the long run, it will reduce the cost.

“There is much discussion about digitalization and taking the new tools in use will require much investment. So there will be a cost associated in digitalization which in the long term, reduce the cost.” HH

The pricing model mainly depends based on service. The pricing model also differs from the nature of the company, for example, in the case of taxi service. There are a few traditional taxi company and some shared taxi services. Their price model also differs as per the service delivery model. The traditional taxi companies are operating based on their profit target after the operational cost; on the other hand, the shared taxi service they are working to meet the needs of the market. They work for fulfilling the market demand. If we compare the structure of these two types of companies business model, their pricing is mainly dependent on the operational cost of both of those companies. RM of Oulun Energia thinks there is much application with taxi services. Those offers a different kind of service in a different pricing model. It is the customer who is deciding which one to pick. Their processing techniques also depend on the range of service they are offering.

“There are some applications with new taxi services, it would be nice to see what kind of vehicles and pricing is convenient to travel.”

There may come different sort of cost elements come in the future. As with technological advancement, everything is changing so fast, and there will many costs added related to technology. HH of Business Oulu believes that many costs associated with implementing blockchain will come up.

“...mainly Tech-related costs. The cost of developing a blockchain system may be a higher initial investment integration cost when you start
to incorporate the new technology. There is always an opportunity cost, using one system compared to another’s in the long term.” HH

This kind of change will take place even after a few years as there is pressure to reduce the cost of the public sector. HH of Business Oulu also mentioned that there would be fewer people working on society and industries will be run out of money. Digitalization and Artificial intelligence will take an important part in this transformation. Where all the money will come is a question may be the cost of that transformation and digitalization will be an important part of cost element.

“There is a heavy pressure to reduce the cost of the public sector, and that comes with the facts that there will be less and fewer taxpayers and nature of the work will change in any way, the whole society will change. So, where will all the money come to run the public sector, That drives to reduce the cost of the public sector.” HH

There will some cost element emerge from the environmental perspective. In the smart mobility area, then we need to count the carbon emission from vehicles. This is already in effect in most of the cities. City organizations are also limiting the pollution to create pressure on the citizen and forcing them to abide the environmental regulation. Some cities are giving incentive to electric companies that produce environment-friendly electricity and incentives to those who buy electric cars.

“Its need to take account How much Carbon emissions are coming from traveling, and they need to do some limitation of the pollution, and it might create pressure to the city. This way to effect can be traveling can be significant.” RM

Other elements: There are some important that create an impact on the future of smart cities. Most importantly, on the internal and external environmental issues. The internal and external environment factors will be changed in the coming years. HH of Business Oulu thinks the external factors, including external companies, will find ways to serve the cities and the citizens. “External will find new ways to serve the city services and citizens.”
City organizations are driven by policymakers and most of the policymaker is involved with the political parties and political issues. Government is mainly responsible for this kind of issues.

“Then actually it comes to the govt how you manage those change. Those political leaders those change” – HH

**Business Opportunities:** There are mainly two sources of business opportunities, one is the value-creating by offering the service, and the other one is through the other sources. In the case of the city organization, business opportunities may come from other sources. In the future, there will much more co-operation from both the private and public sector. City organizations are open up with the collaboration, and they can search for experts to outsource some of their activities. HH of Business Oulu also mentioned that there would collaboration from the city with industries and mainly with experts.

“There will be much more co-operation and significant change in these processes and tool. They need to start opening up and also outside. So it is not they are directly outsourcing but finding an expert.” HH

There are some global issues as well, which makes city authority to implement the blockchain based smart city innovations. For the last couple of decades, enough is talking about sustainability and environmental issues. We have seen now electric cars are on the rise. This gives the intuition to think more about global issues. Some nations and cities are giving importance to environmental issues. Our neighbor country Norway, giving incentive to those who are buying an electric car. As a result, the number of car selling increased for the last few years. The main aim of the city is to not making anything harmful to the environment.

There is another crucial aspect of global issues like if one city gets the benefit from those can be transferable to other cities as most of the cities around the world face a more or less similar type of problems. HH of Business Oulu gave importance to the transferability of the solution across the globe, and he also mentioned that many big companies are also offering service to cities.
“The cities are creating a kind of global market for the companies. So the business opportunity for the company coming from the fact that, if it works here it will work somewhere else. So, that might even create a new sector in the global business in the smart city solution, big companies like Microsoft, Cisco, Nokia are already offering solutions globally.”

RM of Oulun Energia believes there will be more business opportunities will come and mostly related to the technology sector, and the businesses will create solutions for those.

“New technology will open new possibilities. There are many kinds of role in business opportunities. There many people who want to have new technology it offers new opportunities.” RM

Regulations will be another vital element that will enforce the cities to implement the city smart city initiatives. Most of the sector will be highly regulated and have to care for environmental issues. Some companies follow it for regulations aspects, and some companies are following it as a part of the corporate social responsibilities.

“...the regulations can say that technically mobility system all around. Maybe new Law, you need to pay for emission, you need to pay extra or something for this kind of carbon emission things.” RM

There some other things to consider one in terms of legal and illegal aspects. There are few countries and cities where blockchain is not legally acceptable, and those need to change to and consider the legal aspects. From the researcher's points of view, blockchain, based service will get legal acceptance. If the blockchain bases transaction service is acceptable, then the blockchain enables smart city service will also be acceptable in the coming days.

“I think blockchain enable the smart city services to have different angles, whether it can be okay from a legal perspective.” YX
The technological advancement will show a massive change in city services. In 5 years of 10 years in the smart mobility arena, electric cars will be more common. The infrastructure will be more robust and dedicated to serving the people. Other important issues will drive through the electric car industry that’s making strong regulations on diesel fuel cars. Already in a few cities of European countries, the car owner is paying more road tax for using the diesel engine.

“The electric car will be more common after a few years, The infrastructure likely more strong, more serving people.” - RM

The city is more like a private organization. In some terms, the private organization cares about profit and but city care about facilitating the citizens in the same way they have the plan to continuous plan to grow. In this context, city organization should have a good business model which not only supports the business but also reactive to citizens requirements. Blockchain enabled smart city services can make this contribution to be faster, secured medium. Blockchain-based service should be introduced in every possible source for example in education, energy so that people can get the maximum benefit out of that. YX of Oulu Business School believes that Blockchain enabled smart city service can make a meaningful impact on society.

“City is not a different type of organization then the private. The private company cares about profit, but the city collects the tax they need to make the investments to make the city better. In this perspective, the city should have a good business model if the blockchain can help to reduce the cost of making some value. To reduce the cost they can invest in others like education, infrastructure at the same time blockchain can make value people will be happier.”

YX also believe that the opportunity of the city will come up with investors, startups, and the city needs to foster those to attract investors. Investors come based on the benefit they get from the cities; for example, UAE attracted many investors and to come and set up their business in Dubai. That is because the city offering tax rebate and giving ease to do business. So many cities may come forward and set up the
business and attract citizens as well as investors to have all the facility like traveling, healthcare, education.

“The city can add value to attract investors, startup, angel investors. There may be other reasons like travel, healthcare, education.”

Though there are few fundamental difference with the traditional business model with blockchain enabled business model. Some researchers also considered the blockchain technology as one value proposition; is one of the blocks of Osterwalder’s (2010) Business model canvas. So, maybe the city or company are still following their old business model, but with blockchain, the value they generate are not the same as before. This does not mean if they include blockchain that will have impact on the business model.

“companies talk a lot about new technology. It is not a business model; maybe they are still with there traditional business model except that they say they have a new value proposition it is coming from the blockchain.

Apart from all the positive things of blockchain, it has some downsizing factors as well. We already mentioned that they are not as many blockchain developers like software developers in the world. If we want to connect devices all over the world through the blockchain technology quite tricky at this point as it will also consume a lot of computing power as well as electricity.

“On the downsize, Blockchain does have some issues of scaling up. If you are talking about large scale millions of devices, billions of devices connected in real time communication at this point I do consider that is bottleneck or disadvantage of Blockchain that’s for the near term.” YX

There is another perception in the people's mind that, blockchain is related to the bitcoin, and after the bitcoin failure in several places, it lost its trust in peoples mind. From the researcher's point of views, people rarely understand the blockchain they
misunderstand with good and bad news about the bitcoin market, which is also affecting the blockchain technology in the long run.

“this blockchain is associated with bitcoin and bitcoin goes up and down. When people do not understand the blockchain and people hear this sort of news about bitcoin, good and bad news, so I think that will also affect peoples perception and adoption of BC.” YX

The following chapter will conclude the research by answering the research questions and secondary research question. To conclude the conclusion chapter will discuss the theoretical and practical contribution of this study. This part will also show the validity and reliability of the study and in the last subchapter avenue for further research scope in a similar field.
7 DISCUSSION AND CONCLUSION

This chapter will focus mainly on the discussion on the research outcome and concluding this study. The research questions then secondary research questions will be answered accordingly. After answering the research question, the theoretical contribution will be demonstrated. Then the reliability of the research will be discussed, and finally, this chapter concludes with limiting factors of the study will further research scope.

7.1 Answer to the Research Question

The primary objective of the study is to see the influence of Blockchain on business models that are developed for smart city services. To do this, we studied the framework of a smart city in detailed, Blockchain as technology, business model thinking, and to foresee the future research method CLA has been used. The research question of the study has been developed in a way so that the study can analyze the present comparing with future scenarios. The answer to the research question also helps city organization and policymaker to make policy or formulation of decision. The main research question has been formed to uncover the influence of Blockchain over the business model.

- How could Blockchain influence Business Model that are to be developed for Smart City Services?

This initial research question is more specific and can be segmented in two parts; 1) How Blockchain can influence the Business Model and, 2) Business model of future smart cities. The first part of the research question is to discuss mainly the Blockchain and how it can influence the business model of the smart city sector. The second part is concerned with the research method used in this study. The secondary research questions for this study is to support the original research question into a more profound level.
- How blockchain can contribute to smart city context?
- How could Business model elements evolve in the future?

The first subsequent question will respond the how Blockchain can contribute to the smart city context, and the second subsequent question has been focused on how Blockchain enabled smart city services will evolve in the future. Those two are more general questions and most of those already answered in the theoretical framework and during answering the first research question. In the following, we will answer all those questions sequentially. This study also uncovers some probable business model elements and how it influences by blockchain based service. To do this, the study conducted an extensive literature review to know the core concept of the business model; blockchain enabled smart city services. This study also combines theoretical understanding and validate the data with empirical findings.

There are many potentials of blockchain technology for the smart city sector, and it has an impact on the business model of smart cities. In this subchapter, we will discuss the probable influence of blockchain over smart city business model. In the theoretical framework, the study showed the primary purpose of blockchain in the increase the city operation efficiency. The purpose could be different based on size and demographics, but the fundamentals will remain the same. The very first impact it makes by decentralizing the data. It will empower the citizen having their say on public administration. This can be managed by smart contracts (Christidis, Devetsikiotis 2016). This process can influence the elements of the critical channel of city business model to have clear interaction between city-citizen. In the smart city ecosystem, it will also have an impact on the co-creation with partner organization as citizens can interact with the city organization.

Blockchain enabled smart city services also influence the elements of the Key channel. According to Kim, Laskowski 2018, blockchain technology already contributing to the supply chain process by providing the step by step information from manufacture to end user level. This can also help the city organization to provide the information directly to citizens about the city services. This will give transparency about the source, associated cost of the product and services and in the long run, this will also influence
the key partners of city services, for example, the city partner will be more accountable for the course of action as the service will remain transparent to all the levels.

Figure 16: Business Model of Smart city

Table: Adapted from Urban agende for EU

The study already mentioned that one of the fundamental reason to integrate blockchain technology in smart city services is to ensure operational efficiency, and this can help in reducing the cost for the city organization. Typically the city organization knows the slow and bureaucratic action, but the implementation of blockchain in the smart city services make them accountable for their action. It is assumed that the initial cost of implementation for blockchain in higher, but if we consider the long term future, then it will have a significant impact on the in reducing cost. Another vital element of the Business model is the customer segment; this element discusses who will be benefited by the product or services. This element can identify who are paying customers and who are ready to pay for goods of the business
(Chesbrough, 2010). Introducing blockchain can influence the business model that is
developed for smart city services and sourcing for paying customers or citizens.

The revenue stream elements help to identify the source of money from the target
market or customer. For the long run, the city organization needs to pay attention to
this element. From the research findings, it is predicted in the future; there will be
fewer taxpayers means less revenue for city organizations. Here blockchain enables
smart contract can give actual information about how much revenue the city will make
for a particular period. This will influence the city organization to design the business
model in a way that will help them to avoid any financial crunch.

All in all, blockchain enabled smart city services can change the ultimate value
proposition of the city services by providing secured and transparent platform.
Currently, there are very few cities that are using the blockchain technology. Using
this technology will distinguish them from the competitors (Osterwalder & Pigneur,
2005). The research findings show that in the future city will more like an ecosystem,
and citizen will choose a city based the city services and facility. There to ensure
optimum revenue for the city, city organizations will try to attract business and citizens
to live in their cities and pay taxes and use city services. Enabling blockchain based
smart city services will have an evident influence on the core value proposition.

The Business model elements of the future smart cities are predictable based on the
theoretical and empirical findings. The author of this study used the business model
wheel and gave essential BM elements from “What,” “How,” “Why.” The proposed
area of importance given based on the empirical evidence and observation of the smart
city framework. The role of the city organization is changing over time as most of the
cities are becoming more citizen-centric therefore, the BM designed in such a way.

Coming to the Business model element shown in table 8, in regard of “What elements”
(customer, offering, value proposition, differentiation) the author thinks individual
elements have a specific area to concentrate for example in customer segments the
smart city deal with citizen and partner companies. Blockchain enabled smart city
services are the first offering to the citizens. It offers a transparent platform among
city, citizens, and stakeholders. In the “How elements” smart city needs to focus on
the ecosystem, and all the functions are interrelated with one another. This study also found out that city organizations follow very traditional ways of sales and marketing, which need to be more citizen-centric, and the function needs to be more creative focused on the needs. For more interconnected smart city services, there will be more public, private partnership required. Finally, on the “Why elements” the SC need to consider the pricing model as value to citizens where traditional businesses focus on profit maximization Smart city need to focus on value sharing. There might be some critical cost arise due to regulatory functions.

This study will also discover some business opportunities for city organizations to be in the core of the business model. During the empirical findings, different business opportunities have been identified. In the short term, the period energy sector has potential business opportunities. During the mid-term future, we will see the smart healthcare system driven by artificial intelligence. Machine learning has a prospect. In the long term future, there will more opportunities will come from the smart environment arena. Right now there are only a few cities offering service for blockchain enabled smart cities, and most of those are not even on the broader space. Many citizens take this as a competitive advantage to living and set up their businesses in that city.

This study also tried to combine future research method and business model thinking to uncover future smart cities. To do this, the combination of theoretical framework and methodologies combined and compared with the empirical evidence. This study fitted with future studies as blockchain is not well proven yet to evolve in all the elements or framework of the smart city concept. This framework also demands more strategic action. The evolution of the business model is very close to one another (Ahokangas et al. 2015). The business model wheel has multiple angles to see the opportunities which are the best fit with the research topics. This research also used some business models of the Business model canvas to dig deeper into the study topic. In the methodology, there are many tools to study the future like Delphi, Real-time dephi, but the CLA was best fitted into the nature of this study. CLA method discussed how to look at the future and go deeper into the scenario to understand the probable future.
The author followed the scientific methods to foresight; this involves logical explanations and steps. The author of used research method philosophy in two stages, the first one for constructing the questionnaire. The CLA layer has been used, so the interviewee's response also comes from a different period. On the other hand, the collected data used in the CLA pattern; short term, mid-term, and long term future.

In recent time, many big companies are concern about data privacy. In the smart city initiative, many cities will have the data of citizens may be some third party company will have similar data access, but here cities need to concern about the privacy of citizens data. The Facebook privacy scandal has also opened a new horizon about how vital the data could be. On the other hand, the comprehensive GDPR of the EU enforce much organization to abide by the rules strictly. Here cities need to be proactive to inform citizen which data is using and the purpose of using citizen data. Researchers and industrialists have come together to use limited resources for the potential solution due to economic and increased population numbers. This is aimed at improving the pattern of standard living citizens.

7.2 Contribution of the Research

7.2.1 Theoretical contribution

The theoretical contribution is a process based on theory development and a logical explanation. Through a narrative literature review, this is contributing to the research questions and their answers. This study also suggests how to implement the theoretical concepts into the practical field and validate it. This will also give an avenue to offer something unique to the existing literature that can be used in further stages.

The research topic is multi-disciplinary and in much wider possibility. “Business model of Blockchain Enabled Smart City Services” where the business model is considered as core phenomenon and Blockchain enable Smart city service is the context. The CLA method is used as a research method and the collection of empirical data. The study presented the thesis in easy flowing ways and used simple, nontechnical terms to understandable by a nontechnical person. The context of the study blockchain and smart city presented in a discussion from blockchain definition,
show it works, application of blockchain technology, smart city definition, the framework of smart city, how blockchain technology may come in the future. The entire discussion will give more information on the subject topic.

From the smart city perspective, there have been many discussion and what should be in the smart city dimension. Balakrishna (2012) identified six essential dimensions of smart city services. Those are smart healthcare, smart governance, smart mobility, smart energy, smart environment, smart people. Then this framework has been divided into three layered from the features to activity level. Here the author divided that task from top to down function; smart features, smart service, smart application, and smart activity. This is a novelty to the existing literature. The dimension can be used by the city managers or emerging cities as a framework of a smart city. This study also gives an in-depth framework of all the elements of the smart city into layers from Smart features, smart service, smart application to smart activity.

This study also identified some fundamental component of smart cities, those can be divided into three categories, and those are technological factors, human factor and institutional factor (Nam, Pardo 2011), all those components are related with one. All those components are related to each other, and when the social capital utilized through IT Infrastructure and seek to sustainable growth and improve the quality of life and using regulatory factors like policy and regulations, then a traditional city becomes a smart city (Caragliu, Del Bo & Nijkamp 2009).

From the blockchain perspective, the share ledger view between city and citizen has been identified from a few, but this comprehensive study provided a multiperspective view from both city and citizens. In the context of blockchain enabled smart city services, the city and policymakers need to understand the value of the ecosystem. For the city organization, the ecosystem is around the city partners and stakeholders. The city organization needs to identify the balance between innovation and business to know the value creation process, values sharing the process (Iivari 2015). To get the collaboration with the stakeholders and city organizations all the elements of the business model, including the customer/citizen, stakeholders, agencies need to reflected continuously. Moreover to this study can be used by city managers and policymakers who are interested in integrating blockchain into city services.
In the existing literature covered the business model at multiple levels. This study has focused on the business model of a city organization. Usually, most business models tools proposed for the business organization not focusing on the public administration. This study context is a smart city, and this can be treated as a novelty to use the traditional business model for public administration on a different lens. This study thinks the city organization does not approach the way a traditional business does. One of the primary functions of city organization is to creating value for the citizens. If the city advised choosing a business model for its function, the city needs to prioritize the value creation over capturing. If any city organization is interested in value capture, they need to go through different business in considering the reaction from all the level including the citizen, stakeholders, agencies. Moreover to this, some theoretical contribution related question and their answers through the narrative review of the literature.

### 7.2.2 Managerial Implication

The thesis context offers insight into the smart city concept and how it will evolve in the future. The future here presented in the progressive time frame from the short term future to long term future. This study gives a transparent scenario about post implementation of blockchain technology into the smart city area.

The empirical data provides a single business model is not enough for the city organization. They need a separate plan kind of business model to run the city organization. In this study, we used the business model when and some of the elements of the business model canvas to uncover the best scenario. The literature review gives high-quality data to the author to analyze the problem into a more profound level. CLA framework gives the thinking into a more profound level. All in all, this study gives policymakers an avenue to think more profound level. For the public sector, it is essential to be with the policy, Some of those policies may be effective in the short term future but not for the more extended period; policymakers need to consider those.

This studies context involve with all the levels of the society, including from the social practice in everyday life, and future technology, the topic of smart cities in a
continuous period. In terms of Business Model, the study analyze the elements of a probable future business model elements that can be used by various city organization.

Some of the leading tech company is also investing in this technology. Though blockchain yet to prove the technology and does not have any success yet and there has been a lot of shapeless blockchain experimentation without tactical evaluation which will make much company does not see the return of the investment. This is also alarming for city managers and policy makers to chose the blockchain project more carefully.

There are some drawbacks of this technology, and city managers and policymakers need to consider. There have been some negative issues that graved peoples mind, for example, the Ponzi scheme named bit connect used for lending service, but they shut down without even informing the investors. Many people assume the blockchain is related to cryptocurrency and database. Here policy maker and city mangers need to reconsider that fact.

To improve from the situation city manager and policymakers need to consider a few key points, very first ones must be any city organization that starts with a need unless there is a need for blockchain. Secondly, a firm needs to have a clear goal and ROI on how it will create an impact. The value of blockchain enabled smart city services comes from its network effect their majority of stakeholders must be aligned. Finally, companies must agree to a path adoption; it may require enough economic, technological support unless those the technology will not be successful and will face challenges, including innovators dilemma. City managers and policymakers should take some critical strategies in terms of justifying the blockchain investment; the proper strategic approach can extract the proper value in the short term.

From the empirical findings, HH mentioned that Finland is concerned about serving all the cities at a similar level. Therefore, there is the project of big six cities from the southern part to the northern part of the country. The economic scenario of the southern part is different from the northern part, but the project aims to serve all the cities at a similar level. Another insight from this study is the cities of Finland realized the needs and benefits of working together not just competing for one other; HH also mentioned
this in Finland six cities are working together for ensuring better citizen services. This mindset will help many cities in sharing thoughts, and service delivery as most of the cities are facing a similar type of problems. This mindset is mandatory for sustainability. Blockchain enabled service itself a complex issue to solve but with sufficient time and simplification of innovations with enabling the city service to adopt in the more extended period. Future studies sometimes seem unreliable to the general readers, but this can be validated by discussing the facts, logic. Using a future study tool, a manager can better understand the social and systematic change to reach an objective.

7.3 Validity and Reliability of the Research

The term reliability means consistency of a study or measuring the outcome of the study. If the research outcomes are replicated consistently, they seem reliable. To evaluate the degree of reliability, a correlation can be used. A high positive correlation will be shown if the test is reliable. The research reliability can be two types one can be internal reliability, and the other is external reliability. Validity is the accuracy scientifically, in simple if something is not accurate, then its not valid. The validity of measurement refers to the accuracy of the measure.

If a test has poor validity, that means it does not measure the content and skills related to the job. There are several ways to test validity those are content, concurrent validity, and validity of prediction. It says about the consistency, reproducibility, performance. There are many reliability methods, including test-retest, consistency of decision, internal consistency. For qualitative research, validity and reliability are essential to establish credibility and transferability. As mentioned earlier, that qualitative research is based on subjective, contextual data and questioning the findings; therefore, researchers take steps to ensure that their research findings are valid and reliable. To make it more useful to readers and researchers, the findings must be believable, consistent, and credible. As this research study is qualitative; therefore, much time has been spent on reviewing to judge the reliability and validity of the research findings.

This study context included detailed literature to create the theoretical foundation, contextual study, and research methodology. The wide-ranging literature helped this
study to incorporate different viewpoint to include the overall picture of the study. External validity is applying the scientific study's conclusion outside the study context. This is the extent to which a study can be generalized in other situations, people, and time. The external validity is essential because the research goal is to tell us about the world and more of a research study designed to keep this in mind. For the external validity, the study conducted three experts interviews from the Blockchain/Smart city/Business Model areas and all the interviews transcribed and studied to avoid misconception to maintain the external validity.

Arguments of this study are based on the empirical data. The result of this study has a significant extent obvious theoretical and managerial implications. This study provides insight for manager and policymakers to design long term strategy to improve the area. This research also provides the future of technology and changes in business model elements from the citizen's point of view. The methodology ensures the quality of data analysis and reliability. All the interviewed data has been maintained the privacy, and their name has not been in this entire paper. The interview avoided all kind of trade secret and confidential data. Finally, based on the theoretical framework and empirical evidence, validity and reliability of this study considered to a satisfactory level.

7.4 Limitation and Recommendation for Further Research

There are a few limitations of this study. The process of answering specific and following research questions generates more questions that need to be explored in further research.

Firstly, while constructing the theoretical framework as this topic itself was thought-provoking. The author needed to understand the topic as there is much information about blockchain, smart city, business model, future study methods. The author always tried to keep those terms simple and demonstrated in layman's term. The study covered a wide range of literature to analyze empirical data more carefully. Secondly, as mentioned earlier, the study s provided an in-depth overview of the business model related to the research topic. However, there are more business model tools can be explored. There are not any specific model that focuses on the future business model, so we had to choose the best one to analyze the empirical data. Thirdly, The empirical
data collected from only three industry expert. The research could be more extensive if we could collect data from a couple of more expert. Most of the interviewed data carefully analyzed and used in the findings chapter.

There is another limitation of this we talk so much about the blockchain technology, and there is so many research going on this topic, but in practice, there are very few blockchain developers compare to software developers. So the industry is still immature to start something on this large scale. If their very people know how to code the blockchain and how it works, this will work as a limiting factor for blockchain to enter in more massive scale. The author also needed to decide how much the content will go into a more profound level. As this is a multidisciplinary field and the so start with the historical development to the conceptual level. This study also focuses on the future, and there is a famous speech by Steve Jobs about future that, “to connect the dot one need to look backward.” To see the development of the business model, this study started from the dotcom bubble to today. To foresee the future cities we started from Utopia to current city practice. The author seems valid to look at history from various perspective. The research method has been used a few times and to study the future is more limited, but the author tried to demonstrate that the method is a smooth and flowing way to the general reader. The empirical data collected only for this study. In one side, the author had the freedom to chose from where the data collected from on the other side to synthesize all the sector in one study was a bit challenging. On the other hand, the study focus on the city organization point of view, not from the citizen's point of view. Maybe the citizens have quite a different perspective on the study topic.

Just like all the research work, this study has a new set of queries for further studies. During the collection of empirical data, there has suggested to open up with some additional questions. This study opens an avenue to research on the business model as tools to looks the future business development.

This study also identifies the need for more specific research on the business model of blockchain enabled smart city services. During constructing the smart city framework the author realized that smart city is an ecosystem of different smart or digital initiatives where all the elements are connected to each other. There need to be further
research on this area to see the practicality in this area, whether all the elements can connect to one another and work in a synchronized way.

The study proposed a framework of smart city and that include smart people, smart mobility, smart environment, smart energy, smart healthcare, smart governance. In few areas blockchain already marked its footprint but not on all the individual initiatives. There may evolve a new element or service area to focus on. As this study focused on the holistic smart city idea. To see the practicality there could be more specific research needed may be more specifically on smart healthcare or smart mobility.

Finally, during the data collection and studying the business model of some cities the author recognized one single business modeling tool is not enough for smart city initiative. The business model for smart mobility may not work for smart healthcare. Therefore specific research could be needed for identification of most suited business model for that smart city functions.
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9 APPENDICES

Appendix 1: Interview Questionnaire

Reflection on Blockchain enabled Smart City Services:
- What kind of smart city service may we have in the future? How do you think Blockchain could be fitted in the smart city arena?
- In what context city organization would be interested in Blockchain Enabled smart city?
- Do you think there will be any competitive advantage of Blockchain enabled smart cities over traditional cities in the short term, middle term, and long term future?
- How could Blockchain influence the Business model in the short term, midterm, and long term future?
- How do you think Blockchain enabled smart city has potentials to bring new types of Business model and how?

Questions Business Model “What” Elements:
- How do you think customer group will change in the future?
- What could be the value proposition of city organizations in the future?
- What kind of service companies and city organization will offer in the future?
- Why do you think the city organization in future would be interested in doing this?

Questions on Business Model “How” Elements:
- How do you think sales and marketing approach change in the future?
- How companies associated with city organization gain competitive advantages?
- What will be the critical operations and resources in the future?
- Why do you think social changes will take place in future?

Questions on Business Model “Why” Elements:
- How could the price model change in the future?
- How could the cost elements change in the future?
- What will be the significant Cost drivers for city organization?
- What could cause the change in the pricing and cost structure?

Questions on other BM Elements:
- How could the business opportunity change in future?
- Do you think the business opportunity could come from a different source?
- What global issues could affect the creation of such opportunities?