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IMPLEMENTING AGILE LEAN IN TELECOM INDUSTRY

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ABSTRACT

With the introduction of new technologies, there has been a huge competition in the Telecom industry to maintain the customer base and stay at the top of the competition. In order to retain the customer base, the telecom companies are required to provide a high quality of service to its customers. Agile Lean practices have been implemented in the manufacturing industries for decades and are well known for eliminating waste, reducing the delivery time of the products and services and at the same time enhance the quality of services provided to its customers. This research paper aims to study the feasibility of implementing agile lean principles and practices in the telecom industry. This research also aims to understand what are the benefits and challenges of implementing agile lean in the telecom industry.

KEYWORDS:

1. **INTRODUCTION**

Telecommunication commonly referred to as 'Telecom' can be defined as the exchange of information over a significant distance by means of electrical or electronic devices like telephone, radio, mobile phones, VoIP, broadcast networks, etc. ("What is Telecommunications?", n.d.). It has been recorded in the history that the early telecommunication started using smoke signals and drums as a means to convey the messages and in the 19th-century telephone was invented by Graham Bell. Since then there has been a tremendous technological development in the field of telecom ("History of Telecommunication," n.d.).

With the introduction of new and complex technologies in the Telecommunication industry, there was a need for the telecommunication companies to be more efficient which lead to the concept of a call center. These call centers were introduced around 1960's. The purpose of the call center was to respond and resolve the issues raised by the customers using their services or products. These call centers then evolved into the customer service department as we know it today (Herschberger, M, n.d.). During the 90's companies started to outsource the customer service and since then outsourcing customer service center was considered to be a strategy.

Customer service is very important for any organization because it is the only way the customer can interface with the company. The customers pay money for the services provided by the companies and when they have issues or questions regarding the service they expect the companies to resolve the issues (Suttle, R. n.d.). A company with an excellent customer service is more likely to retain and get a continued long-term business from the customers resulting in

increased sales and profit. On the contrary, if the company provides a poor customer service then it is more likely that the customer may discontinue the business with the company and this will have serious business impacts to such companies. It is a lot more expensive for a company to acquire new customers than to retain the existing. Hence, it is important to invest in enhancing customer service as it pays off when the customers deserve what they pay for.

With the advancement in the technology, the Telecommunication industry is not just limited to telephone service providers, but Cable and Satellite TV operators, Internet service providers. As a customer, who is using the services provided by these operators, it is not visible as to what goes on in the background, what does it take to provide a seamless mobile wireless service or uninterrupted high-speed internet connectivity or live broadcast of Superbowl. To provide these services the operators need to set up and maintain a complex network in their back offices spread across the nation. These complex networks are not easy to be set up and maintained and there are multiple providers involved to keep the network downtime as small as possible. With such complex setup, it is possible that there are issues from time to time in the services that are being provided to the customer. But since the customer is being charged for the services, the service providers are required to provide a good customer service. However, the competition amongst different service providers is fierce to retain their customer base and provide the customers what they have paid for.

According to a survey conducted by Procera networks, the Telecommunications industry was ranked second in terms of worst customer service after the government services which was ranked at the top of the list (Jackson, J, 2015). This indicates that the customers are not being

provided the quality of service by the telecom service providers. It is easy for any customer to switch the service provider if the customer is not happy with the services.

New emergent technologies like Voice over IP (VoIP), Internet TV and the Over the Top (OTT) services are becoming popular because of their cheaper rates and enhanced services. The most common OTT services would be Skype, Whatsapp, etc. These technologies require just internet connection and they bypass the voice network of the wireless telecom service providers. This is impacting the revenue of these telecom operators. The telecom operators are losing millions of dollars to the VoIP and OTT operators (Unuth, N, n.d.).

In this research, the author shall explore the current telecommunication industry trends and the challenges that telecommunication organizations are facing in order to sustain in the market. This research paper shall also explore the principles and practices of agile lean and analyze if agile lean can be implemented in the telecommunication industry to address these challenges. The researcher shall conduct an extensive literature review and surveys for this research.

2. PROBLEM STATEMENT AND JUSTIFICATION

Communication is a very important part of our life. People communicate with each other every single day. With the advancement in the technology over the past several years, telecommunication has become a very crucial part of our daily lives. With the advancement in technologies over the past years the scope of telecommunication industry has broaden immensely. The telecommunication industry is not just limited to voice services but it includes multiple service providers like telephone companies, internet service providers, wireless service providers, cable and satellite operators ("Renewing U.S. Telecommunications Research", n.d.).

Telecommunication industry provides a service to all its customer and this requires the companies to provide a customer service for its customers. Customer service is very important for any organization to survive and succeed. A lack of good customer service may result in the loss of potential customers. Over the past decade, the competition and deregulation in the telecommunication industry has opened doors for the customer to easily switch their service providers. This creates a challenge for the telecommunication companies to provide a quality service to retain their customers.

Delivering a customer service in a telecommunication industry is challenging and difficult because unlike any other product companies, the telecom companies provide a service that is not visible to them. The consumers can't see the service unless something goes wrong with the service. Initially the telecom operators were providing just the voice services, but with the evolution of technologies and the struggle to stay in the race the telecom companies have started providing

additional services like broadband, mobile data services, TV, etc. In this setup, multiple service and equipment providers are involved in delivering these services.

Problem Statement: According to the research by eMarketer, telecom subscribers are cutting the cord on telecom services resulting in loss of around 22.2 million subscribers in 2017 (Sprangler, 2017). Given other emergent technologies competing with the telecom, failure to respond to customer needs could ultimately lead to loss of Market share.

3. LITERATURE REVIEW -- ANALYSIS OF RELATED WORK

According to Zuhdi. M (2012), the strategic competition amongst the telecom companies changed with the introduction of the internet. Before the emergence of internet, the telephone and the cable companies operated side-by-side as they offered different services. Since then there has been a massive transformation in the structure and the rule of the competition. This competition intensified when the telecom industry was deregulated in 1996 via the Telecommunications Act of 1996. This opened the gates for the new entrants in the telecommunications market. The growth in the use of internet required these operators to invest heavily in network infrastructure and new technologies to fulfill the needs of the customers and provide them quality of service. The telecom operators faced a challenge to earn profit after spending massive amounts on network upgrades and maintaining competitive prices to retain and acquire new customers. Another challenge according to Sujata et al. (2015), that the telecom operators (especially the telephone and cellular operators) are facing is the emergence of Over the Top (OTT) services. These OTT operators use internet as their channel to provide services like audio, video and other multimedia services by bypassing the traditional voice network. At present Telecom industry is faced with a huge competition and there is a need for these companies to provide a high quality of service to its customer to stay on top of this competition (Kocova, 2014).

Lee H.S, (2013), suggests that in such intense competitive markets the telecom companies need to provide high-quality service to its customers. The higher the quality of service the higher is the customer satisfaction, which eventually leads them to be loyal to the service providers. These loyal customers often pay for premium services and are potential source of referrals for the telecom

companies. This helps to increase the business of these telecom companies and increase their market share (Hossain & Suchy, 2013). Customer service is an interface between the customer and the service providers. Customers contact the customer service when there is something wrong with the service or when the service received is not as per the expectation. A good customer service representative is responsible for communicating clearly to the customer, managing their problem, and take appropriate decisions. Effective customer service always leads to customer satisfaction (Khan & Afsheen, 2012). According to G & Rajan, (2013), Retaining a customer is the key element to the success of every organization and it has become challenging in today's saturated telecom market. The research suggests that the cost of retaining a customer is less as compared to customer acquisition.

In 2001, a group of 17 individuals met at a ski resort in Utah to ski and relax, and a manifesto for agile software development was emerged which was signed by all the participants. These 17 individuals named themselves as "The Agile Alliance". The agile manifesto was designed as an alternate to waterfall approach which was plan-driven, document-driven, and process-driven. The agile manifesto has 4 core values and 12 principles.

The 4 core values of agile software development as described in the manifesto are

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

The 12 principles behind the agile manifesto are

- Our highest priority is to satisfy the customer through early and continuous delivery of valuable software

- Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage

- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale

- Business people and developers must work together daily throughout the project

- Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done

- The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

- Working software is the primary measure of progress.

- Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely

- Continuous attention to technical excellence and good design enhances agility

- Simplicity--the art of maximizing the amount of work not done--is essential.

- The best architectures, requirements, and designs emerge from self-organizing teams

- At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly

The concept of Lean was first introduced by Toyota, a Japanese car manufacturing company. According to Sundar, Balaji & Satheeshkumar (2014), Lean is a technique which is considered to reduce waste, and by reducing the waste the value of the product is maximized. The concept is also commonly known as Toyota Production System (TPS) or Lean manufacturing. Any process or activity that does not add any value is considered to be a waste. In lean these wastes are identified and they are either reduced or eliminated resulting in improved efficiency, reduction of cost, and improved quality (Modi & Thakkar, 2014). As described by Rodriguez, Partanen, Kuvaja & Ovio (2014), the lean thinking is based on the five principles. They are:

- Value: Value defines the needs of the customer

- Value Stream: Collection of processes and procedures to deliver value to the customer.

- Flow: Ensures that the value stream flows continuous and enables smooth deliveries

- Pull: Delivering only when the customer demands it.

- Perfection: Continuous improvement to ensure no defects.

Mary Poppendieck and Tom Poppendieck have introduced the concept of Lean Software Development in their book. The Lean Software Development is adapted from the Toyota Production system and it translates the lean manufacturing principles and practices to software development domain (Lean Software Development, 2018). The principles of the lean software development are:

1. Eliminate Waste
2. Build Quality In

3. Create Knowledge

4. Defer Commitment

5. Deliver fast

6. Respect People

7. Optimize the Whole

8. See the whole

The TPS system helped Toyota to reduce waste and save costs. This system was originally designed for manufacturing industries only, but the benefits of TPS caught attention of non-manufacturing industries too.

One of the study explores the value of Lean in service sector. According to Arfmann & Barbe (2014), there seems to be no debate over the usability and usefulness of lean service. The assumption is that the lean manufacturing approach is suitable for the service sector and seems that no one wants to question these beliefs. The research conducted by Arfmann & Barbe (2014), indicates lack of debate regarding the value of implementing lean in service organizations. The lean principles defined by the Toyota do not necessary apply for service organizations because of the difference in the push and pull practices, inability of storing capability, and the variety of the demand.

To provide a high quality of service, Quality Management should be one of the most important management strategy for the companies to gain advantage and improve the quality of service. Six Sigma is one of the quality management tool that provides improved results by

continuous improvement and variation reduction. Six Sigma was originally developed by Motorola in 1986 and later adopted by GE. According to Chiarini (2013), organizations have achieved better customer satisfaction, lower operating costs and process improvements by implementing Six Sigma. According to Kocova (2014), "Six Sigma is a data driven, by the statistically-based approach, which aims to deliver near zero defects for every product, process, and transaction within an organization". Kocova (2014), explains that there are two Six Sigma methodologies, 1) DMAIC and 2) DMADV. Each methodology has 5 phases.

DMAIC stands for

- Define: What are the problems that need to be solved

- Measure: What is the capability of the

- Analyze: When and where do these defects occur

- Improve: How can the processes be improved

- Control: What control can be implemented to sustain the change

DMADV stands for

- Define: Define the new process or goals

- Measure: Measure the product or process capabilities, risks.

- Analyze: Analyze to identify alternatives

- Design: Design an alternative based on the analysis.

- Verify: Verify the implementation of the alternative

According to Kocova (2014) the main difference between these two methodologies is the goal of the company which can be to generate a positive quality or to eliminate a negative quality.

The DMAIC methodology is used in an organization when an existing process needs to be improved, whereas DMADV methodology is used in an organization when there is a need to create a new process or any product.

Lean and Six Sigma are the two most popular process improvement methodologies which are intended for any organization that strives for operational excellence. In spite of the differences in the concepts of these methodologies, a combination of both may create a room for more (Assarlind, Gremyr, & Bäckman, 2012). According to Zhang et al. (2012), Lean Six Sigma (LSS) is a combination of Lean Manufacturing and Six Sigma. LSS is a well-structured methodology which is capable of improving performance, customer satisfaction, effective leadership and bottom line results. LSS applies the combination of techniques and tools used by the Lean manufacturing and Six Sigma. Studies conducted by Tenera (2014) suggest that the implementation of LSS can lead to improvement of project management processes through continuous identification and evaluation of improvement capabilities. For this study a classic DMAIC approach model was proposed and it was tested in a telecommunication company.

The telecom industry should think of the entire process as a production line instead of treating each department as individual function within the entire organization. Späne, Gröne, Acker, & Friedrich (n.d.) explains in their research that "Telecom operators need to see all parts of their operations as assembly lines that produce only what their customers want and/or are willing to pay for". Each process defined should add value to the product or services delivered. According to Späne, Gröne, Acker, & Friedrich, Telecom operators waste almost 30% of the process-related expenditure. A lean approach would enable these operators to eliminate waste and create a robust

platform. Their research suggest concludes that the telecom operators may find it unable to compete if they don't implement lean in their organization.

The Lean Six Sigma has not only benefitted the manufacturing and production industry but also other service industries. Research by Ahmed, Manaf, & Islam (2013) document the effects of Lean Six Sigma in healthcare services. The healthcare service is a very critical and highly regulated to ensure quality standards, because the customers are the patients and the healthcare services affects the lives of the patients and their families. Increasing cost and waste are the main contributors for the high operating costs in the healthcare services. The LSS enables the healthcare to provide a good customer service by continuous improvement in the processes and procedures. The implementation of the LSS can benefit the healthcare services in terms of higher quality of service, improved operational efficiency and cost saving.

4. RESEARCH METHODOLOGY

This section outlines the research methodologies that were used to conduct the literature review and procedure to collect and analyze the responses.

A Literature review was conducted to study and analyze the current research and studies conducted in the field of agile lean and telecom. The researcher conducted a primary research using the database's available in the Harrisburg University's library and Google scholar. In all the researcher collected around 40 papers and articles to conduct the literature review. All the 40 papers and articles were studied and out of these the researcher shortlisted approximately 20 articles. These papers were based on the agile lean and its application, study the telecom industry culture and how the customer satisfaction impacts the organizations.

A quantitative methodology was selected for this research paper. A structured questionnaire was created to collect the responses to understand the viability and benefits of implementing agile in telecom industry. The questionnaire consisted of close ended questions and the responses for this questionnaire were collected via an online survey. The online survey was the most efficient way of collecting the survey as the selected audience were geographically distributed. The audience selected for collecting the responses consist of project managers, product owners, scrum master and team members. The selected audience were either actively working in the telecom industry or were a part of the telecom organization during their professional career. The reason for selecting audience with telecom background only was to understand their views on

agile implementation based on their experience in telecom industry. It is assumed that most of the selected audience have a fair knowledge of agile lean or use agile lean in their organization.

The questionnaire used for the survey is listed in Appendix A. The survey consists of 10 questions and these questions are categorized. The first three questions are focused on understanding if the participants have experience working in telecom industry and if they have any knowledge of agile lean. Questions 4 through 7 are categorized to understand the view of the participants on the feasibility of agile lean implementation and understanding the benefits and challenges of implementing agile lean. Questions 8 through 10 are organized to determine if the agile principles of eliminating waste, deliver fast and enhance quality of service can be achieved by implementing agile lean in telecom.

5. FINDINGS

This section of the paper represents the findings based on the responses collected and the analysis that was conducted on the collected responses. The responses from the participants were collected via an online survey. The participants were asked to respond to a questionnaire which consisted of 10 well structured close-ended questions. The online survey announcement was sent out to approx. 30 participants. The participants were mix of Project Managers, Scrum Masters, Product Owners, and Team members.

A total of 22 responses were received for the survey. The survey questionnaire is structured to understand if the respondent is familiar with Agile Lean and its application, how viable is it for any telecom organization to implement Agile Lean and the factors that will benefit the telecom industry by implementing agile lean and what are some of the challenges that the telecom industry would face in implementing agile lean. The survey concludes by understanding whether the agile lean implementation would benefit the telecom industry in identifying and eliminating wastes, improve the delivery/resolution time to the customers and improving the quality of service to its customers.

The survey starts with a question to understand if the participant has any experience in telecom industry. Since this research paper is focused on agile lean implementation in telecom industry, the survey was floated to the participants who are related to the telecom industry. Based on the responses received, all the respondents are currently working in a telecom industry or they have worked in the telecommunications industry in the past. This indicates that all the participants

understand how the telecom companies operate, the operating models, the organizational culture of telecom companies, the technologies used, the regulations and the standards that are required to be followed in any telecom organization. Figure 1 shows that 100% of the respondents have experience of working in telecom industry.
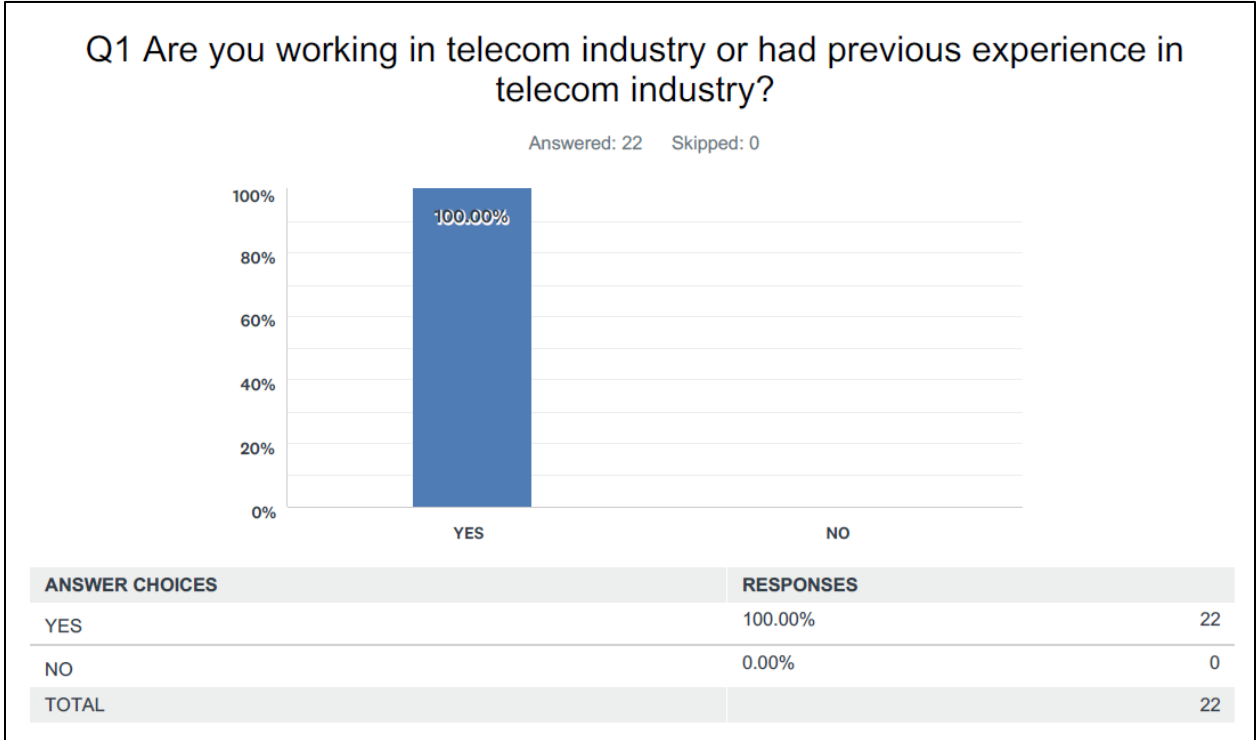

Q1 Are you working in telecom industry or had previous experience in telecom industry?

Answered: 22   Skipped: 0

ANSWER CHOICES	RESPONSES	
YES	100.00%	22
NO	0.00%	0
TOTAL		22

Figure 1. Experience in Telecom Industry

The next step was to understand if the participants are familiar with Agile lean and if they have agile lean implemented in their respective organizations. 90% of the respondents are familiar with the Agile lean principles and concepts. This indicates that these 90% of the respondents either have complete knowledge of agile lean principles and have implemented agile lean in their organization or they are aware of the lean principles and practices. Only 2 respondents out of 22 were not familiar with the agile lean concepts or have a very minimal knowledge about agile lean.
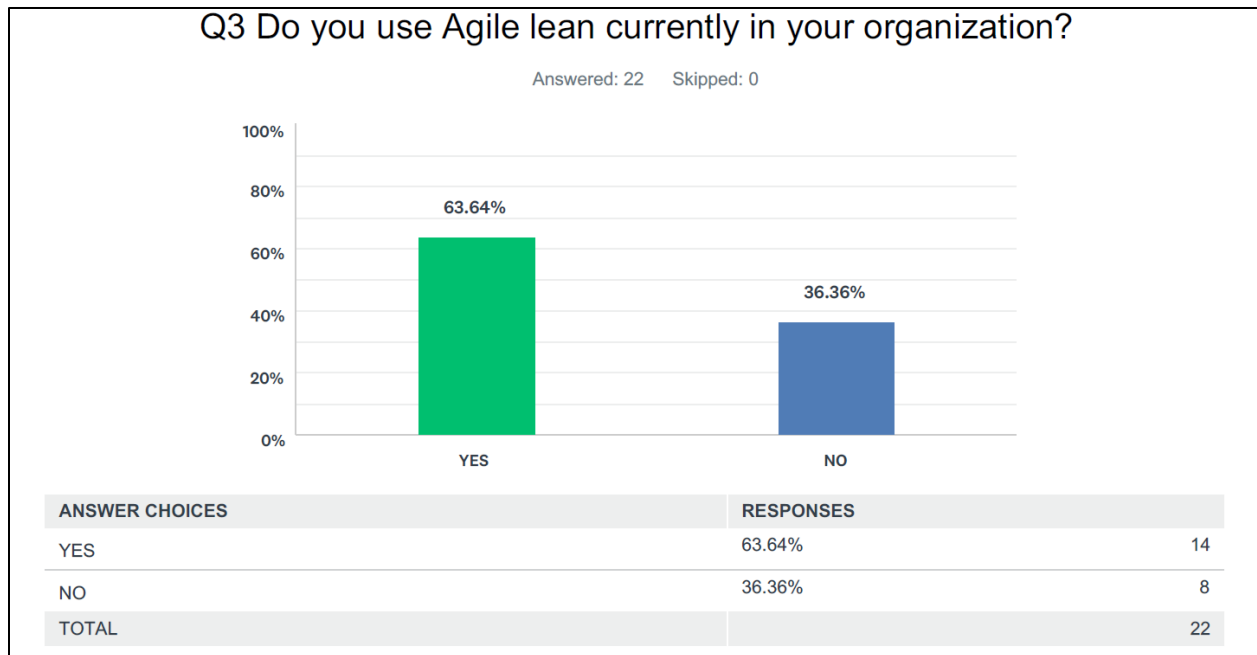
Figure 2. Use of Agile lean in current organization

The participants were asked a question if their organization currently practices agile lean principles. Around 64% of the participants responded that their organization has implemented agile lean. It is possible that the agile lean principles and practices are either implemented at just project levels or at enterprise level. It is also possible that out of the 64% of the participants, some of the participants have agile lean implemented entirely or it might be possible that they have implemented agile lean partially on top of the existing methodology being used in the organization. The remaining 36% of the participants indicated that their organization currently does not exercise any agile lean practices, however based on their responses from previous survey questions, it is evident that they are aware of the agile lean practices and principles. This indicates that it is feasible to implement agile lean in telecom companies, since two thirds of the participants indicated the same.

So, the next question that the participants were asked was how viable is it for the telecom companies, based on their operating models and organization cultures, to implement agile lean. The figure below displays the responses from the participants. Most of the respondents think that it is viable to implement agile lean in telecom companies. Only 4.55% of the respondents think that it is not viable to implement agile lean. Out of all the participants, 45.54% believe based on their experience that it is viable to implement agile lean. Since their response is exactly in the middle of the scale it can be possible that either they already have agile lean implemented in their organization or based on their knowledge they believe that it is viable for the telecom industry to adopt the agile lean principles and practices. The 9.09% of respondents definitely believe that it is very much viable to implement agile lean. This indicates that they all have agile lean implemented in their organizations or the telecom organization that they have worked with in the past. This also suggests that agile lean implementation in telecom organization is not common and it is possible that agile lean is challenging for the telecom organizations to implement. Based on the overall response received, on a scale of one to five, the respondents have rated the viability of implementing agile lean in telecom organization as 3.5.
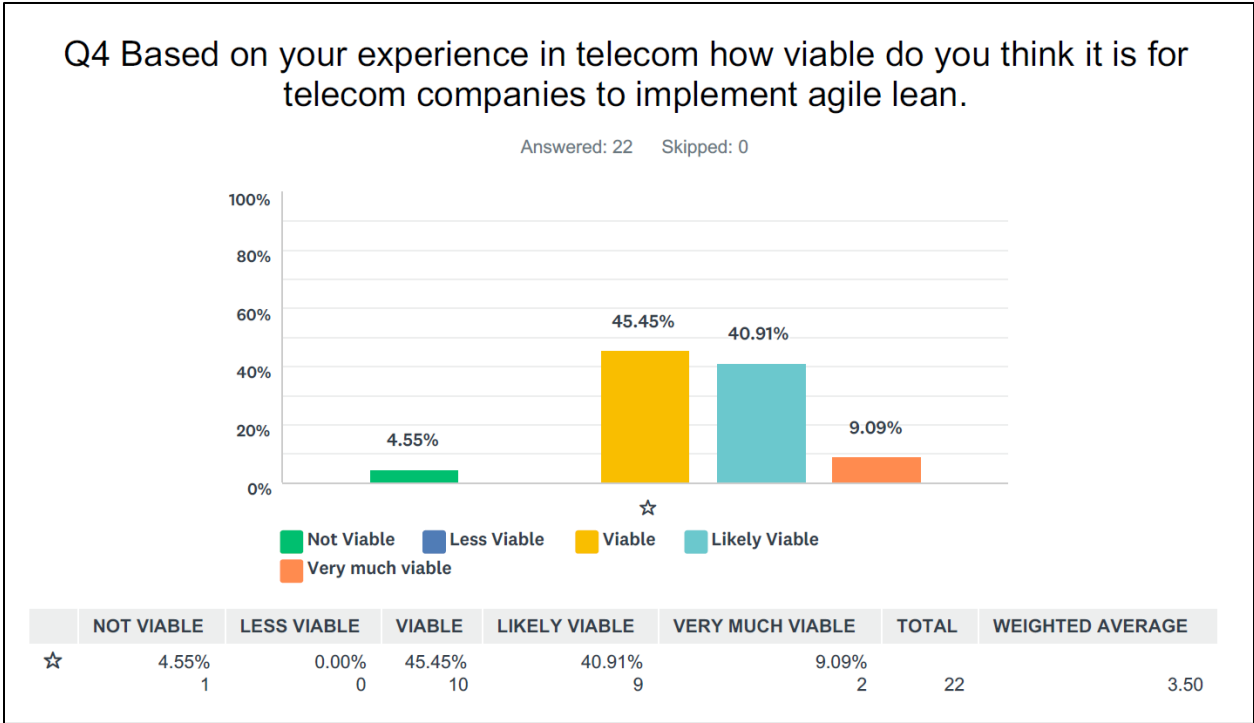
Figure 3. Viability of implementing agile lean in Telecom

The next couple of questions in the survey were focused on understanding the benefits and the challenges of implementing agile lean in telecom industry. The participants were provided options to select from to collect the responses instead of keeping the question open-ended. This allows to analyze the results in a more efficient way. The participants could select multiple options that they think will benefit the telecom industry. As displayed in Figure .. the respondents think that the top two benefits of implementing agile lean would be the improved Quality of Service (81.82%) and Improved Customer Service (68.18%), whereas 54.55% indicate the benefit of agile lean implementation in the reduction of operating costs in an organization. This indicates that the 81.82% of the respondents have either experienced an improvement in the Quality of the service after implementing agile lean or they believe that the Quality of the service can be improved based on their knowledge if agile lean and telecom experience. 68.18% of participants have responded that agile lean can improve the customer service based on their experience or knowledge in agile

lean. It can be possible that these respondents have either improved the customer service experience in their organizations or projects by implementing the agile practices or they believe that agile lean can improve customer service based on their observation. Only 50% of the respondents think that agile lean implementation would benefit in reducing complexity in the organizational processes and practices.
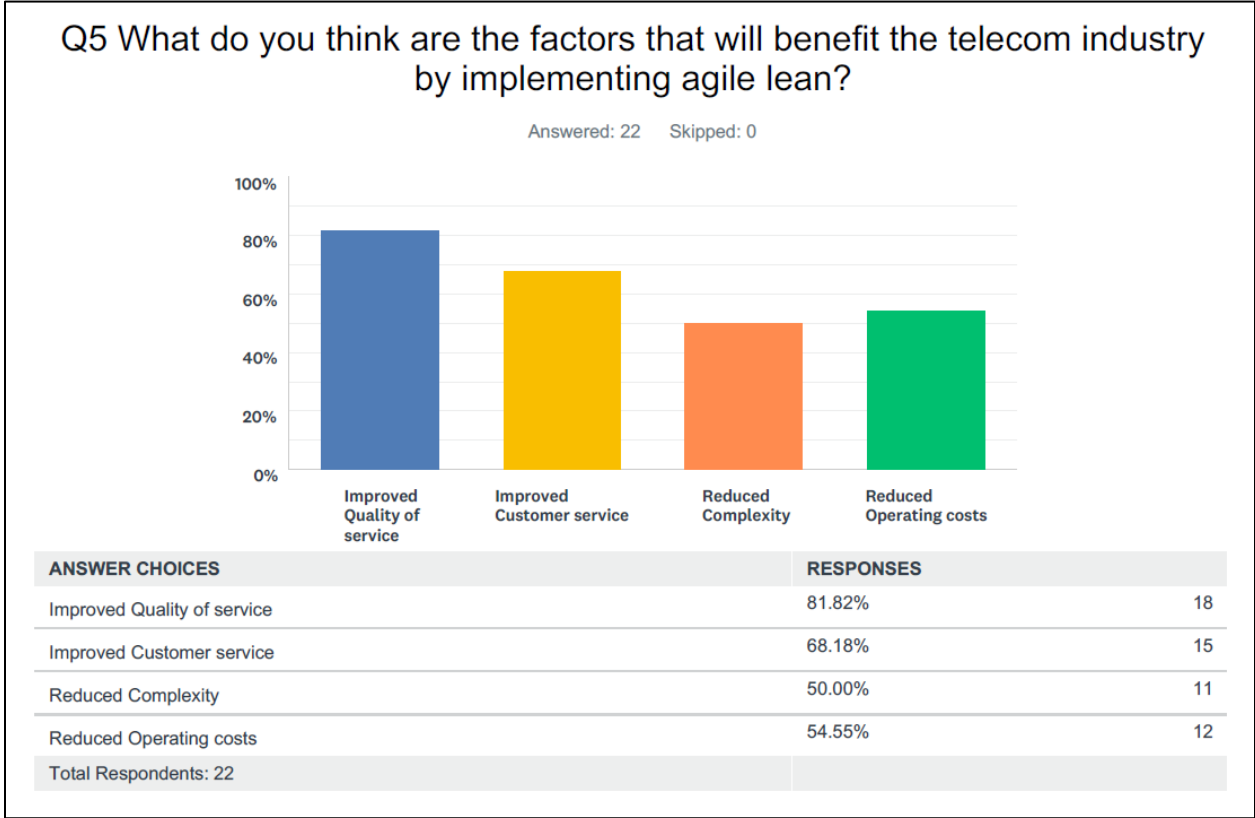

Figure 4: Factors benefiting telecom industry

After indicating the benefits of the agile lean implementation, the participants were asked to select challenges that any telecom organization would face in adoption of agile lean. Based on the responses the biggest challenge that any telecom organization would face in implementing agile lean is the Telecommunication Regulation. Approx. 37% of the respondents indicated Regulation as the biggest challenge, followed by Way of Thinking (~32%) and Cultural shifts

(~27%). Only one response indicated that agile lean adoption in telecom industry is not a challenge. This indicates that Telecommunication Regulations are limiting the use of agile lean practices and principles for some functions or departments in the telecom companies. Certain policies and the laws set forth by the regulating bodies may be impacting the telecom companies in adopting the agile lean practices and principles. This however does not mean that the regulation is completely preventing the companies from implementing agile lean.

Q6 What do you think are the challenges of agile lean adoption in telecom?

Answered: 22   Skipped: 0

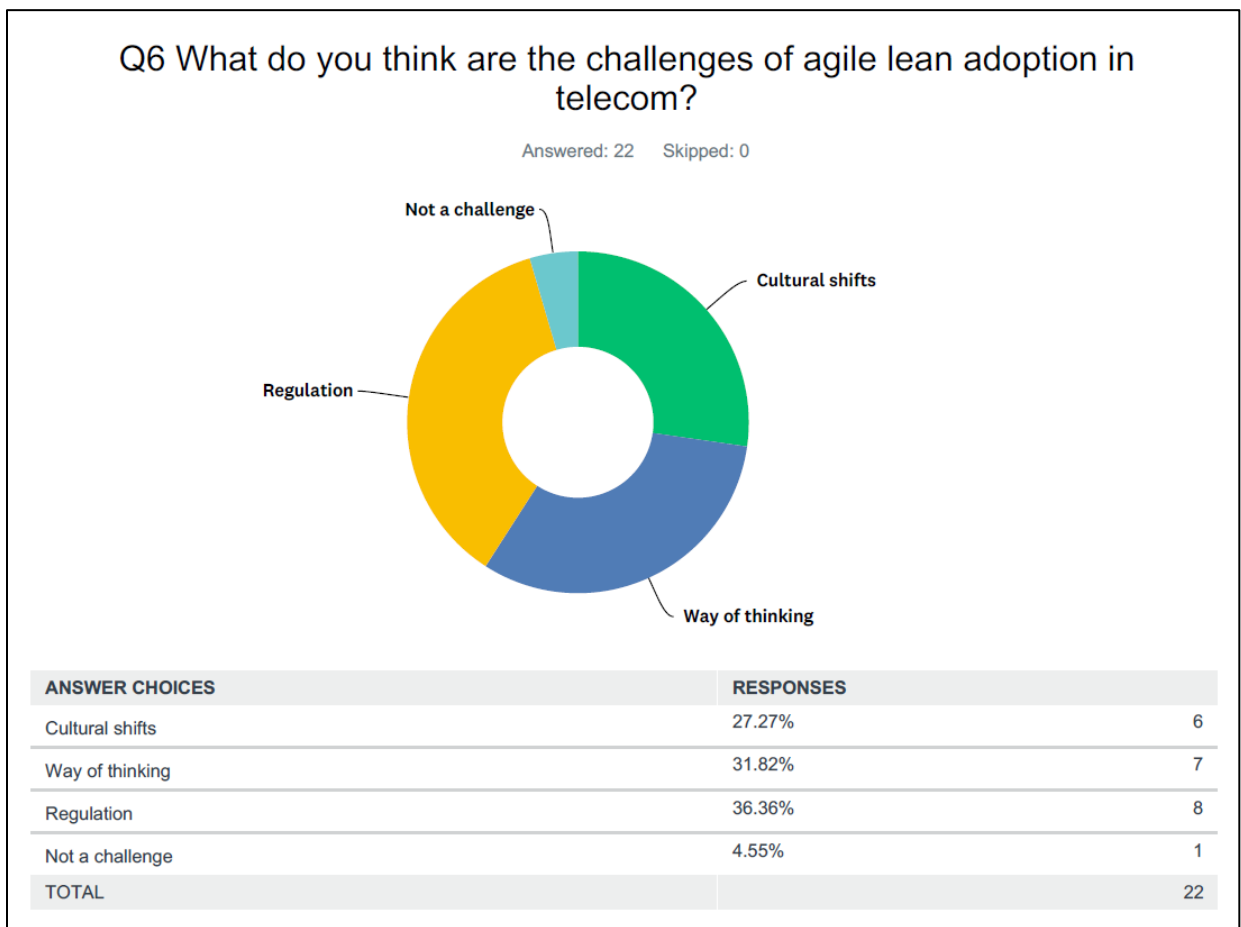| ANSWER CHOICES	RESPONSES	
Cultural shifts	27.27%	6
Way of thinking	31.82%	7
Regulation	36.36%	8
Not a challenge	4.55%	1
TOTAL		22

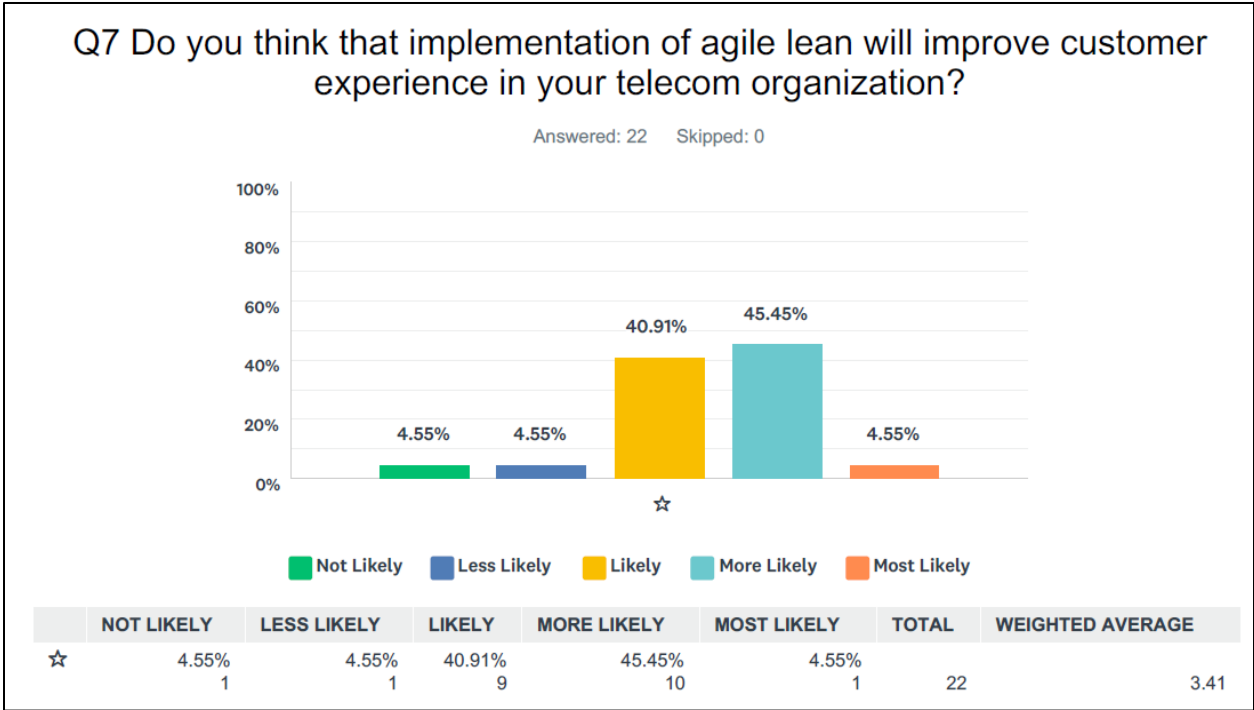Figure 5: Challenges of Agile lean implementation in telecom

Figure 6: Improvement of customer experience in telecom

The participants were asked if they think that agile lean implementation would improve the customer experience in their telecom organization. The participants were asked to rate their answers on a scale of 1 to 5 which were labelled from "Not Likely" to "Most Likely" respectively. 4.5% of the respondents are very confident that the customer experience will be improved with the adoption of agile lean. This may indicate that the respondents have improved the customer experience using agile lean in their organization. Out of the remaining respondents 45.45% believe that agile lean implementation would more likely improve the customer experience in the telecom organization and 40.91% believe that the customer service is likely to be improved by implementing agile lean. This indicates that these respondents have either benefitted by implementing agile lean in their organization or they believe that the customer service will be improved based on their agile lean knowledge and experience in telecom industry.

The last three questions in the survey were focused to understand if the principles of Agile lean can benefit the telecom industry. For this survey only 3 principles of agile lean were identified and selected. They are Eliminating waste, Improved resolution time and enhanced quality of service to the customers. The participants were asked if they think that the implementation of Agile lean in a telecom industry would benefit the organization in identifying and eliminating wastes, Improving the delivery or resolution time of the products and services that are offered to the customer by the telecom companies and enhancing the quality of service provided to the customers. The responses to these questions would help to determine if Agile lean implementation can help the telecom companies to provide a quality of service to its customers and sustain the fierce competition in the market.

Q8 Do you think that implementing agile lean in the telecom industry would benefit the organization in identifying and eliminating wastes?

Answered: 22   Skipped: 0

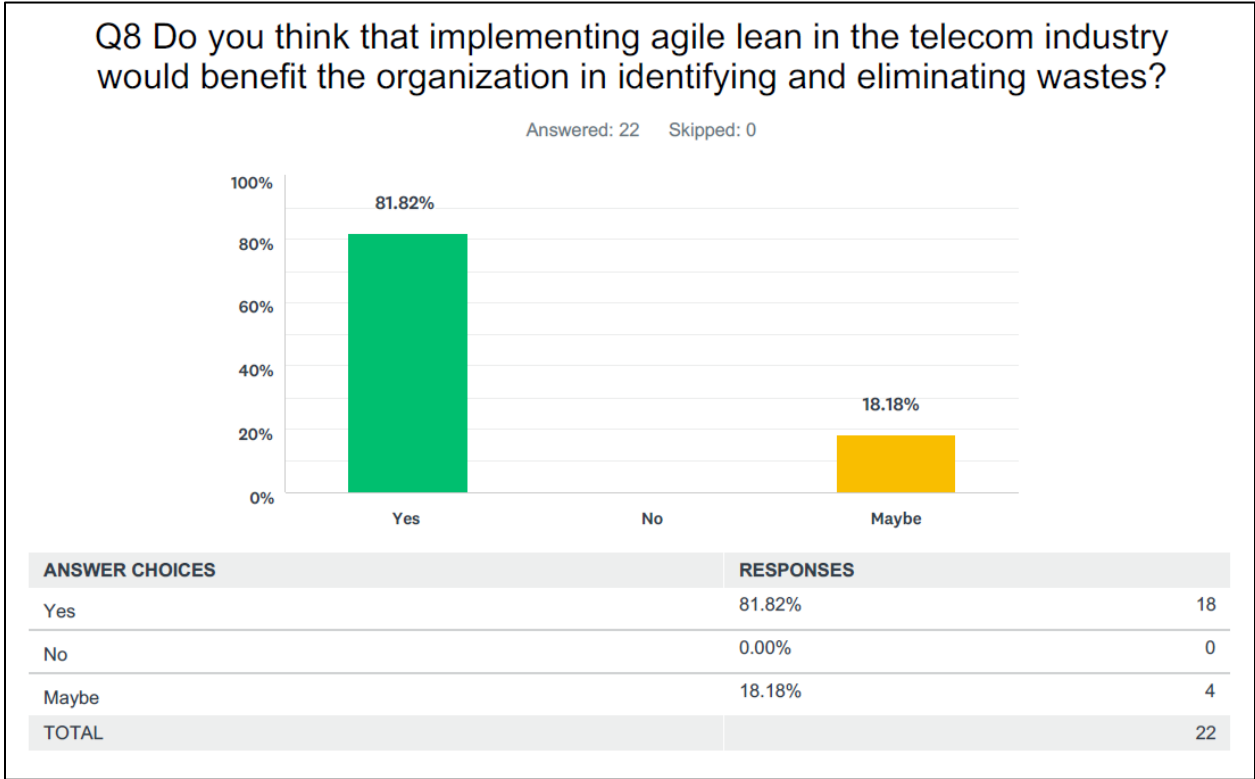| ANSWER CHOICES	RESPONSES	
Yes	81.82%	18
No	0.00%	0
Maybe	18.18%	4
TOTAL		22

Figure 7: Eliminating waste in telecom industry

As shown in the above Figure, around 82% of the respondents think that agile lean can benefit the organization in identifying and eliminating wastes which can help the telecom organizations to improve the efficiency. The remaining 18% of the respondents think that agile lean may benefit in identifying and eliminating wastes. Looking at the 18% of the participants, it can be inferred that they might have applied agile lean in their organization however either they are yet to see the results of agile lean to identify and eliminate waste or they don't have agile lean implemented in their organization. There were no participants who deny the statement put forward in question 8. This indicates that none of the participants have experienced any disadvantage of agile lean in identifying and eliminating wastes.
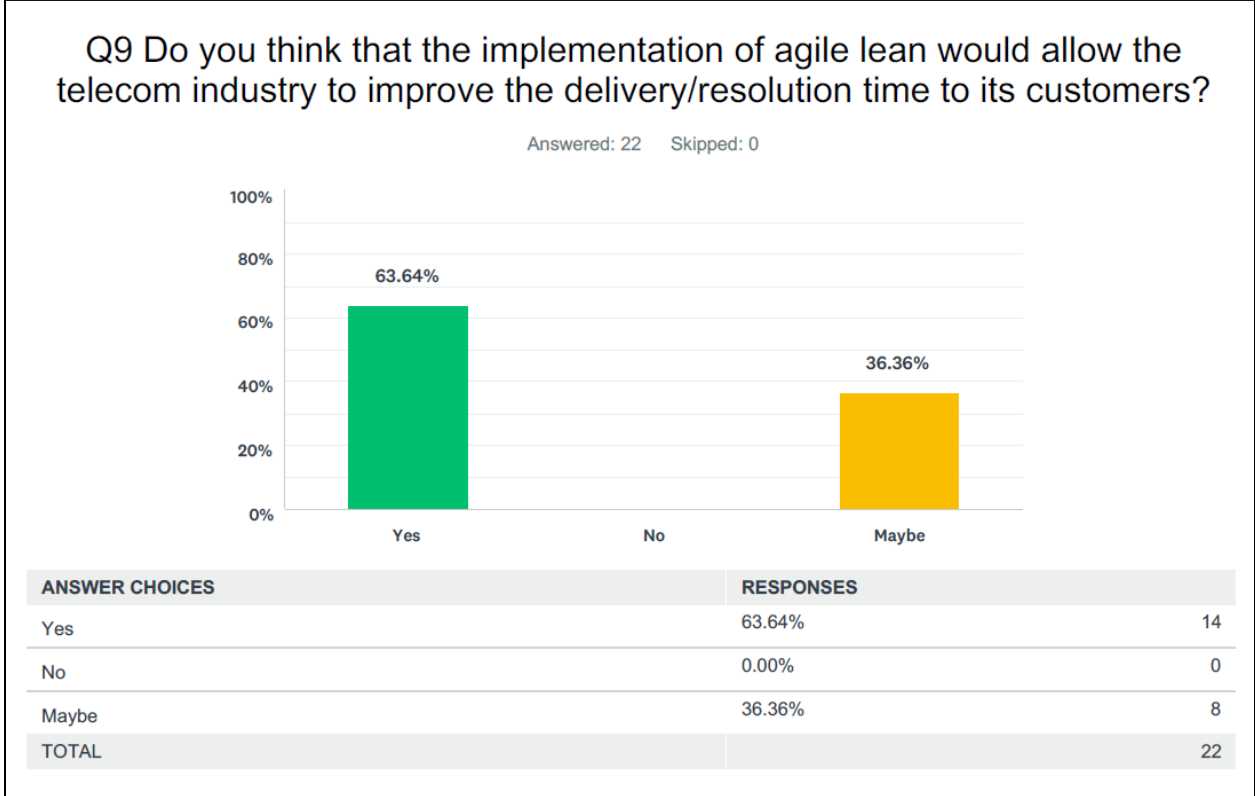

Figure 8: Improved delivery/resolution time

The above figure indicates that around 64% of the respondents believe that the telecom industry would be able to improve the delivery time of the product or solution to its customers. The remaining 36% indicated that agile lean implementation may enable the telecom organizations to deliver its products or solutions fast to its customers. The participants who have responded "Maybe" to the question are not denying the fact that agile lean implementation would actually improve the delivery/resolution time to its customer, but they are not completely sure if agile lean can benefit the organization to improve the delivery/resolution time of the products and services to its customers. One of the possible reason for their response would be that they have studied the "Deliver fast" agile lean principle, however they have not seen the results of agile lean implementation in improving the delivery or resolution time to its customers first hand. Another possible reason would be that some of them might have implemented agile lean in their organization, however they are yet to realize the results of the agile lean implementation.
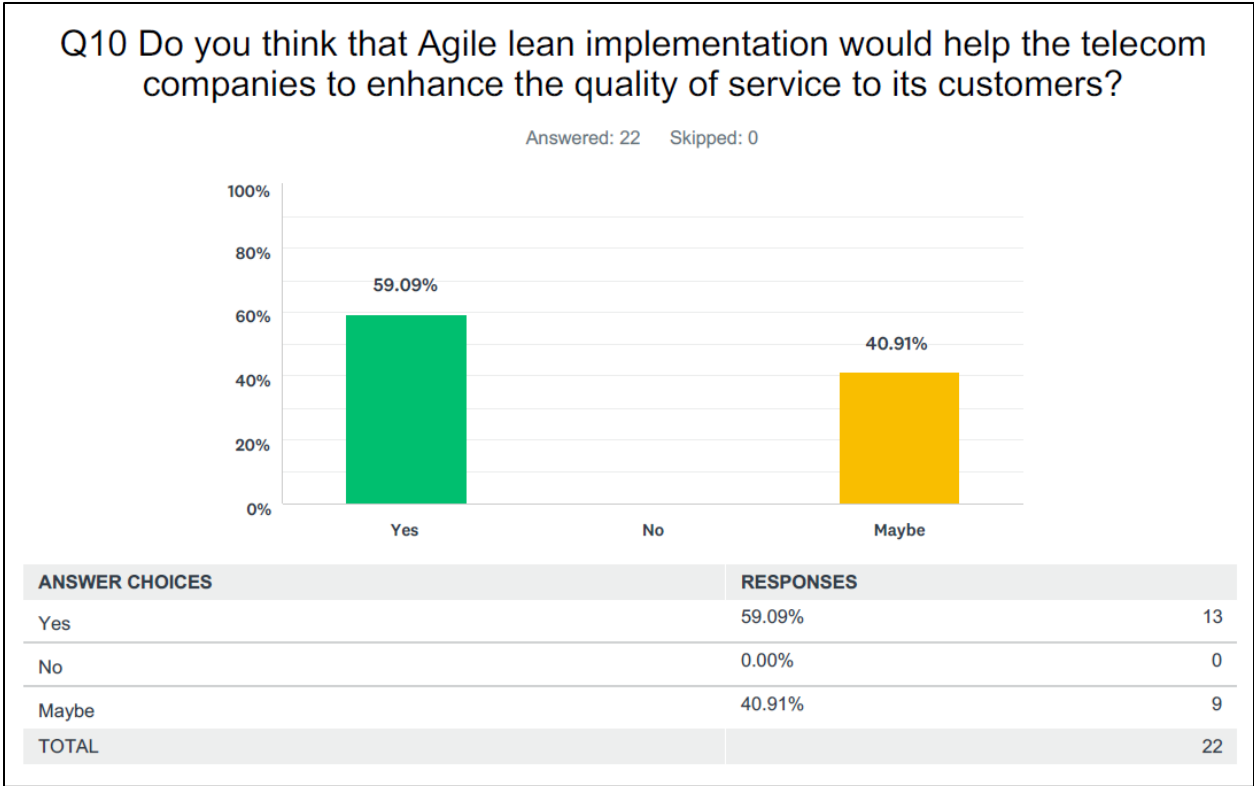
Figure 9: Enhancing the quality of service

The participants were asked if agile lean implementation would enhance the quality of service provided by the telecom companies to its customers. As indicated in the above Figure, 59% of the responses agree that the implementation of Agile lean would definitely help the telecom organizations to enhance the quality of service to its customers. On the other hand, around 41% of the participants think that the quality of the service may be enhanced if the telecom organizations implement agile lean. This may mean that these 41% of the respondents either have implemented agile lean and are yet to provide the enhanced quality of service to its customers or they are yet to implement agile lean and based on their knowledge they believe that the quality of the service to its customers will be enhanced.

Based on the responses collected on the Q8, Q9 and Q10, the agile lean implementation would definitely enable the telecom organizations to identify and eliminate the waste, improve the resolution time to its customers and enhance the quality of the service provided to its customers.

6. CONCLUSION

The literature review was conducted to study the culture of telecom industry, understand the concepts of agile lean and its application. The literature review suggests that there is a huge competition in the telecom market, especially with the introduction of internet and other emergent technologies. The telecom companies are required to provide a high quality of service to its customers if they need to be on the top of the competition. In order to sustain in the market, these telecom companies are required to maintain the existing customer base in addition to acquire new customers. Hence, it becomes very important for these telecom companies to maintain a high customer satisfaction index by providing excellent customer service and quick resolution time. Studies suggests that agile lean principles help to eliminate waste, reduce operating costs and provide a quality to the customers. Agile lean implementation has been successful in industries like production and manufacturing. Based on the success of Agile Lean, other industries have started to implement agile lean in their organizations to eliminate waste and deliver quality to its customer. Since agile lean practices and principles are flexible, they can be modified and applied partially or in entirety in the organizations. One of the research papers have demonstrated successful implementation of Agile Lean in healthcare industry. Another research suggested that implementation of agile lean may benefit the telecom companies to reduce cost and provide quality service to its customers.

To support the findings in the literature review, the researcher conducted a survey to collect data to study the implementation of agile lean in telecom industry. All the participants who responded have experience of working in telecom industry. These participants are either currently

working in telecom companies or have worked in telecom companies. Amongst these participants most of them have agile lean implemented at project level or at enterprise level in their organization, however the remaining participants are aware of agile lean practices and principles which enabled them to respond to the survey based on their knowledge and research. The results collected from the data suggest that it is viable to implement agile lean in the telecom companies since some of the participants have agile lean implemented in their organization. The results indicate that agile lean implementation in the telecom companies can benefit them to reduce the operating costs and improve the quality of service provided to its customers. However, one of the top challenges that these telecom companies may face is the telecom regulation laws and acts while adopting Agile Lean in addition to the cultural shifts and ways of thinking in the telecom sector. The responses of the survey also suggest that agile lean implementation can improve the customer service experience in the telecom companies. The participants also responded that the telecom companies can benefit in identifying and eliminating waste, reduce the response/delivery time of their products or services to its customers and enhance the quality of the product or services provided to its customers by implementing agile lean.

Based on the study conducted in the literature review and the findings from the survey it can be concluded that it is possible to implement Agile lean in telecom industry. By implementing agile lean in telecom, it will benefit the companies in providing high quality services and products and at the same time reduce the delivery and resolution time. This will also benefit the telecom companies to improve their customer service and eventually increase the customer satisfaction. However, because of telecom regulation laws and way of thinking in the telecom industry, it will

be challenging for the organizations to implement agile lean. These organizations would need to

tailor the agile lean principles and practices to address the identified challenges

7. RECOMMENDATION FOR FUTURE STUDIES

Based on the research conducted throughout this paper, it was concluded that it is possible to implement agile lean in the telecom industry to improve customer experience and enhance the quality of service to its customers. The conclusions were made based on the responses received via an online survey. However, there has been a very limited research conducted on the implementation of agile lean in the field of telecommunications. Based on the findings in this research paper, as part of the future studies, the researcher recommends the readers to conduct future research via interviews and case studies to understand how the agile-lean can be tailored to effectively address the challenges of implement agile lean in the telecommunications industry and improve the customer experience.

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APPENDICES

Appendix A:

Survey Questions

1. Are you working in telecom industry or had previous experience in telecom industry?
   Yes- ___ No- ___

2. Are you familiar with Agile Lean?
   Yes- ___ No- ____

3. Do you use Agile lean currently in your organization?
   Yes- ___   No- __

4. Based on your experience in telecom how viable do you think it is for telecom companies to implement agile lean.
   Not Viable →very much viable

5. What do you think are the factors that will benefit the telecom industry by implementing agile lean?
   Improved Quality of service - ____

   Improved Customer service - ____

   Reduced Complexity - ____

   Reduced Operating costs - ____

6. What do you think are the challenges of agile lean adoption in telecom?
   a. Cultural shifts
   b. Way of thinking
   c. Regulation
   d. Not a challenge

7. Do you think that implementation of agile lean will improve customer experience in your telecom organization?
   Less likely - _____   Likely - _____   Most Likely - _____

8. Do you think that implementing agile lean in the telecom industry would benefit the organization in identifying and eliminating wastes?
   Yes - ___   No - ___   Maybe - _____

9. Do you think that the implementation of agile lean would allow the telecom industry to improve the delivery/resolution time to its customers?
   Yes - ___   No - ___   Maybe - _____

10. Do you think that Agile lean implementation would help the telecom companies to enhance the quality of service to its customers?
    Yes - ___   No - ___   Maybe - _____