

The Effect of Disruption Technology, and the Future Knowledge Management toward Service Innovation for Telecommunication Industry 4.0 in Indonesia

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Abstract. — *The disruption technological creates unprecedented opportunities and challenges that will be strengthened by the convergence of digital, physical technologies that characterize the newly emerging Fourth Industrial Revolution 4.0. This emerging technology is extraordinary and has the potential to become a source of growth. The telecommunications industry 4.0 is undergoing transformational development to deal with disruptive technological challenges. Globally, quality has declined from the past few decades, a combination of a stagnant economy and an increase in the quality of income has caused dissatisfaction. Inertia services that are often suffered by large companies are often difficult to shake, customer expectations have also shifted in the market, placing the company in a difficult situation in achieving customer satisfaction, agile and innovative technological trends, cost competition, government policy, and this will increase the level of global competition. Exploration case studies and literature reviews are used to test the antecedents of Service Innovation. The study identifies that disruption of technology services offers opportunities for business development to encourage the use of Internet-based services, increasing demand for cheaper and faster internet for consumers. To facing a competitive advantage, organizations have influenced by Service Innovation with the ability to improve big data analytics and organize future knowledge management capabilities, which are agile and flexible in providing information and solutions. From the managerial perspective, this research provides a comprehensive view of what the impact of Service Innovation is on organizations, how to achieve, what variables contribute, and how to relate with performance. The authenticity of this research lies in the description of how management emerges with a practical oriented framework of how organizations must be formed to be innovative and competitive through the general arrangement of antecedents of service innovation. This study, however, has limitations because the qualitative nature and conceptual framework need to have further investigated through large-scale surveys by quantitative research.*

Keywords— *Service Innovation, Knowledge Management, Big Data Analytics, Disruption Technology, Competitive Advantage*

Revised Manuscript Received on September 22, 2019.

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I. INTRODUCTION

In developed countries, services represent 70, 75, and 80 percent of GDP. Even in China, for infrastructure and mining and construction, services represent almost 50 percent of the economy, the number is overgrowing [1]. Innovation is enormous, based on the availability of knowledge, and consequently, the complexity created through the explosion of richness and attain of knowledge has to be recognized and managed to make specific successful innovations [2] [3]. With innovation, the company's success in developing new and better services solutions as a customer's expectations. To equilibrate the organizations, they want to furnish services that are more responsive and agile [4], [5]. Knowledge is motive power; companies that prioritize are seeking the value of knowledge can win from competitors. Knowledge increased quicker than before, experience, and evaluation of the population in business and generated in an organization for innovation of new products and services in the Telco industry [6]. Changes triggered by way of disruption technology, increasing customer needs, and shrinking budgets have resulted in innovation needed through every organization [7]. Some research has reaffirmed its importance to knowledge management (KM) performs a function in improving innovation and organizational performance [3], [8]–[12]. KM can assist improve communication between internal resources, customers, between top management and staff, and can promote a culture sharing knowledge [13]. Knowledge agencies such as the KM telecommunications industry are needed to manage customers' knowledge (needs, whom to contact, information retrieval), resource knowledge, and where this service is available. Thus, the organization needs to enhance employee's and customer's knowledge, alongside rapidly developing technology [14], [15].

Inequality is mostly an endogenous, not exogenous, challenge for policymakers; addressing it with urgency needs to be prioritized to maintain public confidence in the capacity of technological progress and international economic integration to support the improvement of living standards for all [16], [17]. Inertial services that are often suffered by large companies are often difficult to shake. Changes are trying to do with a broad base of inherited assets that have optimized for specific ways of



working, and knowledge management development in the internal organization [18], [19]. According to [20]–[23], the situation in the telecommunications industry is very critical, but the company can survive by smart and innovative. Stay agile in an ever-changing telecommunication environment becomes a mandatory [24][25].

The new approach taken by many companies to improve services is not helpful; a small grinding process, reduction in fixed costs rarely provide a breakthrough. To redefine service offerings, utilize digital technology using big data analysis, and enhance the customer experience. Focus on service innovation that is in line with the intensity and attention that product companies bring to R & D. The ability to personalize the customer experience and simplify and automate, and the way service is delivery [26][27]. Innovation is the key to creating a sustainable competitive advantage in most industries. Because costs and cost reduction play an essential role in service management, the process of service innovation has discussed from service operations. However, a critical service goal is to differentiate companies by creating more value and satisfying customers better than competitors. [28], [29].

As a telecommunications company (Telco) faces predictions of decreasing income and increase commoditization, building new service offerings will be an essential mandate [30]. Additional from telecommunications operators are facing a rapidly transforming business model. The transformation process and shifting focus towards innovation in service are increasingly gaining attention from academic and managerial practices. Empirical studies and a basic understanding of the underlying processes and strategic decisions associated with reconfiguring service innovation are lacking [31]–[33]. Data is the only core source of income, but a precious commodity. Strategic telecommunications to pursue the next income opportunity, and possible to industry consolidation because tight data competition can force smaller and less profitable internet providers to have pushed out of service innovation through digital services. In industry 4.0, technology will soon take one of the most significant decreases in income, a critical situation when the telecommunications industry is not motivated to improve service innovation and focus on changing customer behavior. Besides, that telecommunication companies (Telco) are not ready to face significant opportunities, challenges in the industry that significantly disrupt technology have driven by markets, excellent service, and can maintain a competitive advantage [34]–[36]. The telecommunications industry has faced with several complexities scattered in various technological advances, customer expectations also shift in the market, placing companies in difficult situations in achieving customer satisfaction, agile and innovative technology trends, cost competition, government policies, this will increase the level of global competition [37]. To overcome this challenge, service companies are asked to develop innovative services, an only through service innovations that telecommunications companies can obtain differentiation from competition both inside and outside the telecommunications sector, through this differentiation, telecommunications companies can avoid commoditization, and because the current conditions are forced to compete only at prices [38].

The telecommunications industry 4.0 is undergoing a phase of transformational development to adopt new technologies and face the challenges of disruptive technology. Industry 4.0 creates a new paradigm for the new market landscape and competition [39]. As reported by The Global Competitiveness Report 2017-2018 [17], the interruption and disruptiveness of technological change are creating extraordinary possibilities and challenges that are set to be amplified using the convergence of digital, physical, and organic technologies that are characterizing the rising Fourth Industrial Revolution.

Looking back at the research literature on service innovation, roughly divide it into three stages: In the first stage service [31], various concepts of technological innovation (product innovation, process innovation, and service innovation) are used to start the production and sale of products and services new. To define service innovation as a change in service operations and expressed in the service process and anticipated by customers and employees [33].

The objective of this study is how organizations in the telecommunications industry face the problem of challenging technology disruption by using service innovation strategies to achieve company performance through competitive advantage. A review of past studies and established theories about competitive advantages, Service Innovation (SI), Knowledge Management (KM), and Big Data Analytics (BDA) will also have discussed. The chapter entails technical review; dimensions of KM, BDA to the relationship between SI and competitive advantage; the conceptual framework; empirical literature review, and the summary of the literature. The theories in competitive advantage include Porters' theory of competitive advantage [40]–[44], resource-Based View theory [44]–[49], and Disruptive Technology Theory and diffusion of innovation theory [50]–[56]. All components positively influence portfolio Service Innovation, which in turn positively influences competitive advantage.

This research is to seek to accomplish and evaluate the effects of KM and BDA through (SI) to lead a competitive advantage (CA) in the communication service provider industry. Based on exploratory case studies and literature review to investigate the relationship between antecedents of SI and KM and to BDA that can be further tested using a quantitative survey. The conceptualization and investigation of the independent and joint effect of SI, KM, and BDA structure on organizational agility highlight the importance of complementarities between antecedents and add to the cumulative body of knowledge in this research area.

II. CONCEPTUAL DEVELOPMENT

A. Service Innovation and Competitive Advantage

More and more companies locate the service business beneath threat. The reason is a member of a new wave of digital beginners who take benefit of changes in technology, customer behavior, and data availability to create modern and customer-friendly selections to the offerings provided using ancient customers [57]. In the fast-changing enterprise world of today, innovation must turn out to be the mainstay of organizations. The nature of world economic increase has changed through the pace of



operations and use them to optimize deployment in real-time through methods such as dynamic discipline dispatching and far off servicing. These technologies are permitting industrial companies to deliver a step-change in effect through improved technician productivity, reduced imply time to repair, and higher patron satisfaction [67]–[69].

B. Knowledge Management (KM) in Service Innovation

There are no formal and structured ways to share and disseminate knowledge and are left to individuals and teams to document or share knowledge. However, this company has gone a long way in Knowledge Management to improve performance [70]. Also, the first step was to identify where the company was in terms of knowledge creation, sharing and application, and its internal capabilities to manage knowledge. It also involved identifying current activities that have classified as KM. However, in the era of knowledge that we live in, the management of intangible assets, namely the management of knowledge assets, has become crucial for the sustainability of the organization's competitive advantage (CA) [64].

Organizational knowledge appears as a result of the dissemination of knowledge generated individually by an organizational structure prepared to support storage and availability throughout the organization. Organizational knowledge creation has understood as a process that expands the amount of individual knowledge that secures it as part of a knowledge network organization [11]. Nonaka, and A. Y. Lewin argues that to improve organizations within a dynamical environment, organizations must not only process information and spread but, to create knowledge. Thus, the KM process appears related to the use, creation, and dissemination of knowledge to enable organizations to obtain CAs that make them survive in this increasingly competitive economy [71]. Several studies have confirmed to examine the relationship between the company's knowledge management and service innovation, and there are a relationship and the results of several studies that state that Knowledge Management has a positive influence on the Service Innovation [7], [14], [15], [72]. Based on the elucidation above, it means that the higher the organization's ability to provide the right solution with a Knowledge Management Capability strategy that can provide added value to the organization, high-level innovation will appear better in the face of service innovation in the telecommunications industry. Therefore, it should suspect that Knowledge Management influences the Service Innovation in the Telecommunications industry in Indonesia.

KM systems have considered useful systems that facilitate learning within organizations and provide CAs. The competence of an organization to transfer knowledge and learning is significant for organizational innovation and competitiveness [64], [73]. More recent research shows that KM processes have a positive and significant influence on organizational innovation factors. Also, to create and share knowledge in a business organization, learning processes are vital to developing a competitive business. Whatever strategy is adopted, currently active KM companies must be able to guarantee, for companies, competitive advantage is needed to bring them to leadership positions. Therefore, future

Knowledge Management must be strategic and aim to identify, develop, disseminate, and update knowledge relevant strategically with the company, through internal and external processes [74]. Knowledge Management tends to has oriented towards human resources, including Information Systems technology (IT) to collect, store and distribute codified knowledge. Knowledge creation of organizations must strengthen the knowledge made by individuals and crystallize data at the group level through dialogue, discussion, sharing experiences, and community practices [75], [76].

C. The Disruptive Technology for the FUTURE of Knowledge Management (KM)

Digitization has finally brought disruptive innovation to the services sector. The disturbance dynamics change from simple disturbances due to specific technological innovations, becoming complex disruptions originating from meeting technological and non-technological trends. To identify complex disturbances of the disruption, business leaders must identify and invest in significant trends that allow disruptions to give themselves real choices to take advantage of opportunities (or not) in the future [77]. The future of knowledge management (KM) to explore the fundamental concepts of what the discipline ought to have and how technology will alternate the function of KM practitioners. Historical factors of KM (some historical nuggets that have to be considered to make the baseline for the Future KM [78].

The evolution of KM consists of three generations; there is no consensus for the third. However, it is only an illustration of the fact surrounding the present-day KM. In 1987 there is an extraordinary book that was published in England by Karl Sveiby, and Tom Lloyd referred to as "Managing Know How." Although the term Knowledge Management has not used here, it offers the organization a structured framework and business instances to recognize why companies need to start to pay attention to their intellectual assets. First evolution KM used to be commonly driven using IT and throughout the emergence of tools such as IBM Notes and the first Intranet (focus on information, not knowledge). Second evolution KM mainly focuses on people and seeks to create processes primarily based on the Nonaka's SECI model how knowledge is generated, made explicit, and socialized within the organization [79]. After the next ten years, achieving the third generation of KM, future Knowledge Management needed to focus primarily on critical knowledge before investing in technological options such as Connectivity, collaboration and shared creations. Then KM finds new varieties of technology that are contrary to traditional IT that have dressed in the way of Intranets, databases (big data analytics), and social networks.

Third-generation KM requires more technology than before. Specific technologies that are made present in the present and that will undoubtedly shape the future of KM are four forms of technology that are combined that will make a big difference in the company: Cognitive technology, Robotics, Artificial Intelligence, and 3D Printing [78]. Robust technology, including quantum computing,

artificial intelligence, robotics, and additive manufacturing in new competitive risks, opportunities, and businesses often struggle to follow and impact KM that can affect the business to market dynamics [80].

specific results such as high value shared knowledge that lead to performance improvement in competitive high levels of innovation that strengthen with analytical cognitive technology capability.

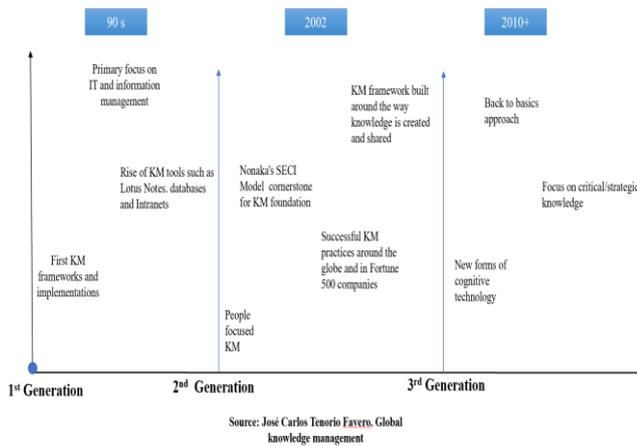


Fig. 3. The Evolution of Knowledge Management

Interaction and flow of knowledge. The organization is started experimenting with using Big Data and analytics to predict what KM content and tools employees will need or want. This methodology also offers significant promise for the track how, when, and why KM allows collaboration within the company related to the difficulty of measuring collaboration and its impact on business results. Collaboration remains a top priority for KM, and it is challenging to do it measuring and tracking. Data and analytics offer new ways for companies to measure collaboration [81].

Intelligence Competitive (IC) is related to intangible assets and involves human capital (skills, training, and experience), structural capital (Information Technology (IT) systems, and corporate culture), and relational capital (internal) knowledge of the external sector, such as customers and supplier). According to [82], Intelligence Competitive is the knowledge that changes raw material and makes it more valuable [63]. There is documentation about the relationship between IT resources and knowledge management; limited information is available on the various types of IT resources that describe this relationship. For decades, the development of information technology (IT) and knowledge management in creating competitive advantages has become one of the main concerns of business scholars.

The changing environment now makes it appear IT-supported knowledge management capabilities (KMC) as the core competence for organizations to improve individual performance, innovation, organizational ability, and competitive advantage. Knowledge management capability can be defined as an organizational process-based capability to mobilize and use knowledge-based resources to gain a competitive advantage [62], [70], [83].

However, this study concluded with the *definition of Future Knowledge Management* is; "The organization's ability of companies to create, organize, use, and manage knowledge and information from organizations to be reused, known, and studied within the organization and aimed at achieving

D. Big data Analytics (BDA)

The big data era has begun in such a way that many organizations in all industries invest in significant data initiatives. From previous research that investment alone did not produce a competitive advantage; on the contrary, companies need to create capabilities found by competing so that the company must match [84]. How best to organize significant data analytics efforts within the organization and what core analytics processes the organizations must support [85]. However, J. Galbraith argues that big data is data whose volume, speed, and variation make it difficult for the Big Data Analytics Capability on supply chain agility organizations to manage, analyze, and extract valuable insights using conventional and traditional methods [86][87].

Therefore, the organization's process, visualize, and analyze data, thus generating insights that allow data-based planning, decision making, and operational implementation [88][89]. Additionally, analytical ideas have gained momentum in recent years, and this requires large scale practice to improve company performance. Even though the technology side needs to be an analytical focus on reliability, adaptability, integration, response time, and privacy, information parties must ensure that information is complete, up to date, accurate, and well presented for decision making make. Similarly, quality talent can focus on technology, managerial and development relational knowledge to develop skilled analysts in emerging evidence-based management. Similar with R. Dubey, A. Gunasekaran, and S. J. Childe information obtained through Big Data Analytics Capability gives companies real-time information about future changes in product demand due to changes in downstream inventory, promotions, and sales [86]. Besides that, the ability of big data (BD) has now attracted the attention of strategic management researchers because of the significant role in the performance and success of the company. Even so, very little empirical evidence so far has been raised about the contribution of Big Data Analytics capabilities to companies Performance and Competitive Advantage (CA) [90].

This study defines the definition of Big Data Analytics (BDA). The Company's ability to analyze, consider and process structured, semi-structured and unstructured data sets, from various sources, to uncover information from unknown correlations, market trends, and customer preferences that can help organizations make better decisions and faster business that is accurate and informed by using data that was previously inaccessible or unusable. In this study, Competitive Advantage in SI, KM, and BDA has developed, and the relationship between antecedents has elaborated.

The dimensions and indicators of all constructs used in the framework have presented in Table 1.



TABLE-I: VARIABLE, DEFINITION, AND DIMENSION

Variable	Definition This Study	Dimensions	Dimensions References
Competitive Advantage (CA)	"The organization's capability to influence business higher than competitors, through optimizing cooperative interaction between service innovation, knowledge management and systems which are updated in line with business demands with competitive environment dynamics, to endured from technological disruptions, and agility in disruption innovation.	Price	Adapted from (Al-Bostanji, 2015; H. I. Ansoff, 1965; I. Ansoff, 1979)
		Quality	Adapted from (M.a Porter & Siggelkow, 2008)
		Product Innovation	Adapted from (Diab, 2014; Erecogović & Talaja, 2013; Zhang & Sharif, 2000)
Service Innovation	Management's ability to change ways and develop new solutions on an ongoing basis in serving customers by creating high value for consumers and increasing revenue for the organization	New service concept	Adapted from (Fosso Wamba et al., 2018)
		New customer interaction	
		New value system	
		New revenue model	
		New delivery system	
Big Data Analytic (BDA)	The Company's ability to analyze, consider and process structured, semi-structured and unstructured Big Data sets, from various sources, to uncover information including hidden patterns, unknown correlations, market trends, and customer preferences that can help organizations make better decisions and faster business that is accurate and informed by using data that was previously inaccessible or unusable.	Technology Quality	Adapted from (M. Gupta & George, 2016). (Anwar et al., 2018)
		Information Quality	
		Talent Quality	
Knowledge Management	The organization's ability of companies to create, organize, use, and manage knowledge and information from organizations to be reused, known, and studied within the organization and aimed at achieving certain results such as shared knowledge, performance improvement, competitive, or competitive levels of innovation that higher.	IT Infrastructure Resource	Adapted from (Mao, Liu, Zhang, & Deng, 2016)(Mahdi, Nassar, & Almsafir, 2019)
		IT Human Resources	
		IT Relationship resources	

III. RESEARCH STUDY AND DEVELOPMENT OF CONCEPTUAL FRAMEWORK

A. Research Design

Exploratory case studies have conducted in the early phase of conceptual framework developed to obtain state-of-the-art insight from practitioners of significant antecedents' influence SI and CA, especially recent antecedents' are not extensively discussed in the literature yet. Second, it will help to clarify the relationship between various SI antecedents and the relationship with CA. Therefore, the framework in this study has developed from both existing literature and contextual field data from exploratory case studies [91]. Five large telecommunication providers organizations in Indonesia have selected for the semi-structured interview. These groups are national companies from Indonesia. These companies have chosen from APJII (Indonesian Internet Service Providers Association) and have categorized enterprises as large agencies having more than one product provider and a couple of project groups that permit us to explore how they manage telecommunication business. Expanded employer definition follows Indonesia Central Bureau of Statistics (BPS Indonesia) classification for the size of the business where a large company has described as an organization with more than 100 labors (Source: www.bps.co.id). The exploratory case studies have based on half an hour to one hour of semi-structured interviews with members of senior leadership in each company. The respondents are management level of the company, such as CEO, CTO, Sales, or Marketing Head or Director of the selected companies who are believed to have sufficient knowledge on both company strategy as well as the business process of the company.

B. Developing the Conceptual Framework

The selection of variables for the conceptual framework is guided by the extensive literature review, by identifying dominant antecedents that have considered should be in place in shaping Service Innovation and Competitive Advantage and were developed through the exploratory case studies. The relationship among variables has examined in detail in this part, and the conceptual research model developed, as shown in Fig. 4.

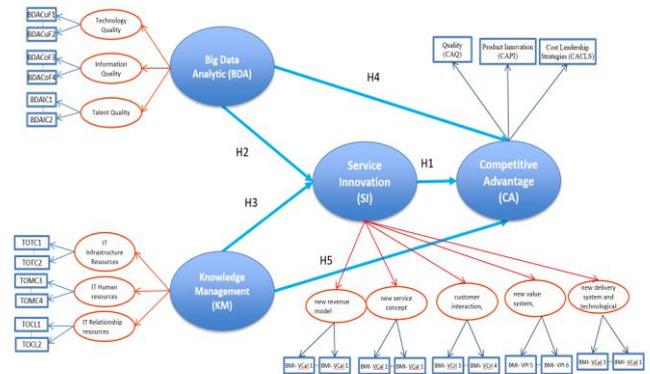


Fig. 4. Conceptual Research Model

1) Effect of Service Innovation on Competitive Advantage

Every organization interested in competing in a dynamic market must create unique benefits that enable it to gain a competitive advantage compared to competitors. The way to get an edge over competitors is through innovation. Innovation as a strategy involves creating new ideas, processes, and methods in doing things that enhance current goods and services or bringing them into new products and services. Several studies have confirmed to examine the relationship between the company's service innovation and performance, then indicating that three frameworks succeed in competitive advantage.

Moreover, meditate the role of competitive advantage to show that there is a relationship and the results of several studies that state that service innovation has a positive effect on the competitive advantage [59]–[64]. The high quality of organization able to provide the right solution with a good services innovation strategy that can provide added value to the organization, high-level innovation will appear better in the face of competitive advantages in the telecommunications industry. It has, therefore proposed that:

H1: *Service Innovation has a direct influence on the Competitive advantage*

Based on a preliminary explanatory study, to strengthen the relationship between each variable, by interview source, this study got the knowledge from the practitioner industry. As stated by the CEO of a Telco Infrastrure company from Indonesia:

"The increase in the as-a-service business model has resulted from changes in each corporate and customer needs. Customer demand for resources has induced innovation in the reuse and remanufacture of goods, reflecting the trend of



environmental focus and a desire to getting entry to over ownership and need to prepare a strategy in service focus to face the competitor”.

As the Network Director of telecommunication operator company in Indonesia, stated:

“Telecommunication operators’ requirements are becoming more magnificent, sophisticated, and more excellent dynamic. They demand service in telecommunication companies to provide an end-to-end solution and attempt to avoid being involved with the complexity to have engaged with comprehensive technology in service innovation”.

2) Effect of Big Data Analytic on Service Innovation

Several studies have confirmed to examine the relationship between the company's Big data analytics and service innovation; then, there is a Relationship and the results of several studies that state that Big Data Analytics has a positive effect on the service innovation [92]–[96]. It has, therefore proposed that:

H2: *Big Data Analytics has a direct influence on the Service Innovation*

3) Effect of Knowledge Management on Service Innovation

Several studies have confirmed to examine the relationship between the company's knowledge management and service innovation, and there are a Relationship and the results of several studies that state that Knowledge Management has a positive impact on the Service Innovation [7], [14], [15], [72]. Based on the elucidation above, it means that the higher the organization's ability to provide the right solution with a Knowledge Management Capability strategy that can provide added value to the organization, high-level innovation will appear better in the face of service innovation in the telecommunications industry. Therefore, it should suspect that Knowledge Management influences the Service Innovation in the Telecommunications industry in Indonesia. It has, therefore proposed that:

H3: *Knowledge Management has a direct and positive Impact on Service Innovation*

As the Director of the company in Indonesia, one a member of FTTH Council Asia Pacific stated:

“To able facing a competitive advantage, the organization needs to become innovative and agile by having future knowledge management. KM is discovering new forms of technology as hostile to ordinary IT that attire in the structure of Intranets, databases, and social networks. The future in this regard is inspiring for KM, and there and many things we can count on in the quick-term. KM practitioners will have to start gaining knowledge of this technology, and a radical shift in their future function is that they may be summoned to feed this system”.

4) Effect of Big Data Analytic on Competitive Advantage

Some studies have confirmed to examine the relationship between the company's Big data analytic and Competitive Advantage, and there is a Relationship and the results of

several studies that state that Big data analytics has a positive effect on the Competitive Advantage [84], [86], [89], [90], [97]. Based on the elucidation above, it means that the higher the organization's ability to provide the right solution with a good Big Data Analytic that can provide added value to the organization, high-level innovation will appear better in the face of Competitive Advantage in the telecommunications industry. Therefore, it should suspect that the Big Data Analytic influences the Competitive Advantage in the Telecommunications industry in Indonesia. It has, therefore, proposed that.

H4: *Big Data Analytics has a direct and positive impact on Competitive advantage*

Based on the preliminary explanatory study, to strengthen the relationship between each variable, by interview source, this study got the knowledge from the practitioner industry.

As stated by the CEO of an operator company from Indonesia:

“The problem is that the extra information and human beings the extra difficult it is to create a transparent, cohesive device and to locate things. Managing a small crew of 5 that works in equal constructing is a lot distinct than managing a crew of 500 unfold throughout nations and time zones. Most of Knowledge management tool must simplify the process to finish the job correctly enough. However, the equipment that is “good enough” today will now not be enough to meet tomorrow’s challenges. The emergence of intelligent information discovery capabilities, machine learning, and automation of all analytical workflows allow companies to manage large amounts of information through big data analytics. Using this information, organizations can predict market trends that bring higher depth to prognostics. Prescriptive analytics goes beyond knowledge, offering actions that are fully supported based on previous results. The recommended course of action to get specific results”.

5) Effect of Knowledge Management on Competitive Advantage

Several studies have confirmed to examine the relationship between the company's Knowledge Management and Competitive Advantage, and there is a relationship, and the results of several studies stated that knowledge management has a positive effect on the Competitive [63], [70], [73], [98]–[101]. Based on the elucidation above, it means that the higher the organization's ability to provide the right solution with a Knowledge Management Capability strategy that can provide added value to the organization, high-level innovation will appear better in the face of Competitive Advantage in the telecommunications industry. Therefore, it should suspect that Knowledge Management influences Competitive Advantage in the Telecommunications industry in Indonesia. It has, therefore proposed that:

H5: *Knowledge Management has a direct and positive Impact on Competitive Advantage.*

Based on the preliminary explanatory study, to strengthen the relationship between each variable, by interview source, this study got the knowledge



from the practitioner industry. As stated by the CEO of a submarine deployed company from Indonesia:

“Leading KM is no longer just about technology, as some people think, first need to find out opportunities and challenges has reviewed. If the organization receive the strategic information and to prioritize the efforts and budget. Then there is the tradition and part of change management. Unifying humans, reducing silos, and promoting sports communities is just another phase of the challenge”.

IV. RESULT AND DISCUSSION

In this study, has theorized that carefully coordinated SI could increase Competitive Advantage and will enhance organizational responsiveness in satisfying market orientation demand. Successful technology innovation has produced by intensive internal and external information processing, coordination, and collaboration of resources under service innovation review [102]

However, this study also emphasizes that as the customer requirement complexity increases in today open innovation era, the capability of organizations to collaborate with partners [103], [104] and to exploit internal organizational structural flexibility [105] become more critical for the success of product development and organization responsiveness in offering solutions to customers. This study provides an integrated perspective, centered on service innovation capability that influences positively on competitive advantage and business performance [106]. This study adds to research that aims to understand the mechanisms through which the three antecedents influence competitive advantage and further enhance business performance through future knowledge management and Big Data Analytics capabilities.

V. CONCLUSION

Exploratory case studies and systematic literature review evidenced that Service Innovation and Competitive Advantage is decisive for business success when an organization is facing intense market pressure [107] [108] [109]. Big data analytics and competitive Advantage determined by appropriate investment in ongoing product renewal and technology extensions, as well as investing in products for the new information for decision making capability [110]. Therefore, the quality of the innovative portfolio is central for strategic decision-making capability, especially when the innovation complexity increases [111], [112].

This study conceptually develops a framework that linked knowledge Management, Big Data Analytics, Service innovation, and examines their effect on competitive advantage. This study employs an information processing theory to propose and examine the antecedents and consequences of business model innovation. The study diverges from prior studies on SI by investigating knowledge management in leveraging external capability and organization structure flexibility to enable organizations to achieve high-quality service innovation capability and competitive advantage, thereby adding to the cumulative

body of knowledge in this research area. The conceptualization and investigation of the independent and joint effect of knowledge management, big data analytics of SI, and on competitive advantage highlight the importance of complementarities between antecedents and set standing for future research.

A Future Research

This research has limitations that only done in telecommunications internet service providers in Indonesia. As an antecedent of the Service Innovation has identified, and its relationship has presented, large-scale quantitative surveys can then be carried out to test the conceptual framework and further explore the role of each variable. Furthermore, future research can be expanded to consider the international implications of research and the broader scope of the industry.

B. Management Implications

From a managerial perspective, this research gives organization management a comprehensive view of how to enhance Services innovation effectiveness and consecutively responsiveness in providing a solution to customers, what essential factors influence it, and their relationships. This study will give the benefit to the telecommunications companies that want to move to 5G service which is still an expensive and lengthy process, by using strengthening monetization of customer data flow, perfecting internal monetization, but especially overcoming external monetization to leap forward and will become an essential part of the strategy. Portfolio managers are suggested to intensify the use of the information system as it positively impacts an organization's innovation program performance by intensifying information exchange with internal and external stakeholders.

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