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**Exploring the killer domains to create new value:
A Comparative case study of Canadian and Korean telcos^a**

Chulmin Lim^b, Joe Rowsell^c, Seongcheol Kim^d

ABSTRACT

Diversifying business portfolios and creating new value has been considered essential strategy for telcos to survive and grow. In this sense, telcos need to find a promising industry called killer domains and concentrate on these to reduce the risk of business diversification. However, few studies have tried to develop criteria for identifying the killer domains applicable to a diverse industrial environment. Therefore, this study aims to explore the killer domains for Canadian and Korean telcos by developing comprehensive evaluation criteria. This study adopted the analytic hierarchy process (AHP) method and surveyed 23 telecommunication experts in Canada and 22 in Korea. From the data analysis, this study found that expected benefit is the most important criterion in decision-making for a telco's business diversification, followed by resource fit and the expected cost. In addition, there were no significant differences in the relative importance of alternative domains in Korea. However, in Canada, digital healthcare was the most crucial domain for Canadian telcos, followed by the security and immersive content industry. The result of this study provides implications for practitioners' and policymakers' decision-making regarding business diversification strategies in the telecommunication industry.

Keywords: Telecommunication industry, Diversification strategy, Killer domain, Analytic hierarchy process (AHP), Canada, Korea, Comparative study

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1. Introduction

Telcos have grown consistently by providing wired and wireless telecommunication services to individuals and corporates, and they are an essential backbone of the digital economy. However, the return on invested capital of global telcos has declined from 25% in 2010 to 10% in 2020 (Bandyopadhyay et al., 2022), and the average revenue per user (ARPU) of mobile service has decreased (PwC, 2018). This indicates that the economic sustainability of their core telecommunications business, which has been their primary revenue source, is under threat. Furthermore, the presence of telcos could be reduced by the growing influences of network equipment providers with advanced network operating technology and global tech companies with their own networks.

Telcos have responded by diversifying their businesses into other industrial domains, such as entertainment, digital healthcare, and agriculture in order to create value and maintain or expand their presence in the ICT industry (Bloomberg, 2022; Jun, 2019; Lee & Kim, 2022; Sehgal, 2022). Even though business diversification has been an attractive strategy for telcos to create value, a high degree of diversification can also negatively influence performance (Liebenberg & Sommer, 2008). Moreover, diversification into an unrelated industry can, in particular, have zero or even negative effects on corporate performance (Vu & Ha, 2021). Notwithstanding the promising prospects offered by a particular industry, telcos may be unable to create sufficient value if the benefits are insufficient and/or the cost of the investment or risk is too high to manage. It follows that telcos should aim to concentrate on those industries known as killer domains, where mitigating the risks and maximizing the returns from diversification.

The first step in identifying which industries offer the best prospects is to establish a set of evaluation criteria. The major criteria may include whether a telco's core resources could be leveraged as an important element within the industry and the potential benefits and costs involved. A systematic industry assessment based on these criteria can be expected to provide

a clearer picture of a telco's decision-making process with respect to business diversification. However, developing a valid decision-making model requires a detailed analysis of sectoral and firm-specific characteristics. Moreover, the relative importance of various criteria and the domain may vary depending on the industrial environment of the country. For instance, governmental policies and regulations that have a significant impact on telcos' business activities (Bauer et al., 2015; Flacher & Jennequin, 2008; Hausman et al., 1997; Meena & Geng, 2022; Parsheera, 2018) may vary in scope or degree across countries. In this sense, the domains into which telcos in each country can enter, or their range of services or products, may differ (Chung et al., 2022; DLA PIPER, 2020), and their perception of the importance of each industry may vary accordingly.

Growth beyond the wired and wireless telecommunication business has been recognized as a crucial task for telcos in many countries. Examining the commonalities and differences in expert perceptions of each industry in different countries would, therefore, be of practical benefit to telcos in setting the direction of business diversification strategies. However, few studies have attempted to establish the criteria for evaluating an industry for diversification or identify key industries across countries (Lee & Ryu, 2019). Hence, this study examines the business diversification strategy of telcos in the Canadian and Korean telecommunications industries. In both countries, three major telcos dominate the local telecommunications market, and their market size in terms of population and revenue is equivalent. However, there are also differences between the two countries. For example, Canada has a much larger land mass and lower population density than Korea, hence telcos in Canada have the highest capital expenditure (capex) to revenue ratio among the G7, Australia, and Korea, and relatively higher network capital costs that make it expensive to invest in a 5G network (PwC, 2021). In contrast, Korea became the first country to launch a nationwide 5G network and commercialize 5G services, enabling Korean telcos to be able to actively expand

their business beyond their traditional telecommunication business.

Thus, experts in each country can be expected to have different perceptions of a telco's business diversification strategy considering the differences in national characteristics, including the industry and regulatory environment. Therefore, this study investigates the killer domains for Canadian and Korean telcos and examines their differences to identify practical implications for telcos in other countries, as well as Canada and Korea. The study may also guide regulators and policymakers in supporting the sustainability of telcos, which play an essential role in the ICT industry.

2. Theoretical background and literature review

2.1 Business diversification strategy

In business studies, diversification has been defined in diverse ways according to research purposes (Reed & Luffman, 1986). It is also a broad concept that depends on how business activity or its range of it is defined (Gort, 1962). In general, diversification has been defined as corporate activities for growth that increase the number of products, services, or markets, whether related to their original business or not (Berry, 2015; Penrose, 1995). However, depending on the perspective, diverse approaches exist to interpret this strategy and apply it to the practice.

Four approaches to a company's growth were suggested by Ansoff (1957). He explained that companies could increase their market penetration by increasing sales of existing products, selling existing products in new markets, or developing and selling new products in existing markets. The last case can be considered pure diversification in the sense of Gort (1962), who tried to understand diversification strategy in terms of the services and products of the company and market. Lichtenthaler (2005) emphasized various options in the decision-making process

for diversification strategy by considering two fundamental components, market and corporate competence and classified diversification strategy. For instance, the 'Pioneering strategy' is to utilize the company's competencies to create new markets that do not exist or to develop new competence for them.

On the other hand, with the 'Buy & build strategy' focusing on external growth with mergers or acquisitions and retaining relevant competencies, a company can enter a new market where others have more competitive competencies when there are time and resource limitations. In addition, the 'Disruptive strategy' was also suggested: utilizing the company's core competence or developing a new one and entering the existing market as a second mover with competitiveness and advantages. These discussions implicate that the aspect or process of diversification strategy can be diverse, depending on each company's purpose or method in conducting this strategy.

Each company can conduct a diversification strategy based on different motivations, such as enhancing competitiveness, diversifying risks, and maximizing resource utilization (Le, 2019). Regardless of its motivation, however, many studies have found that the results or effects of conducting this strategy can vary. Even though the positive effects of business diversification on companies' value and performance have been verified (Li & Kami, 2010), some studies have also pointed out the different aspects of these relationships. For instance, some scholars found that a high degree of business diversification can negatively influence companies' performance (Liebenberg & Sommer, 2008). Others have argued that business diversification in an unrelated industry has no or even adverse effects (John & Ofek, 1995; Vu & Ha, 2021). These findings suggest that in the process of conducting business diversification, a detailed analysis of diverse aspects such as external environment, sectoral features, firm-specific characteristics, and regulations, and accurate predictions of effects and results are crucial (Beckman et al., 2004; Ramanujam & Varadarajan, 1989).

Based on the understanding of the importance of diversification strategies, empirical research has been conducted to identify the critical factors that affect the performance of this strategy to explain and estimate the result of this strategy. As a result, it has been verified that various factors, such as the firm's resources, competency, and managerial know-how, can influence diversification strategies' aspect, degree, and performance (Nelson & Winter, 1982; Teece, 1982). These findings have been supported by studies conducted in diverse contexts, such as media and manufacturing (Chan-Olmsted & Chang, 2003; Lin et al., 2020). Furthermore, based on the fundamental assumption that resource differences of the company can make better performance or returns, and these differences are likely to be constant (Barney, 1991; Reed & DeFillippi, 1990), there have been many tries to explain and examine diversification strategy with the lens of resource-based theory (Wan et al., 2011). These studies commonly argued that the outcome of diversification depends on the type of resource and the way of utilizing it (Nath et al., 2010; Markides & Williamson, 1994). In this sense, it has been emphasized that a company should precisely understand the characteristics of its different types of resources and maximize the outcome of diversification with the synergies from their combination (Farjoun, 1998; Tanriverdi & Venkatraman, 2005).

Prior research has identified the role and significance of diversification strategy in a company's growth and analyzed its approaches, effects, and outcomes in a variety of contexts. In addition, numerous studies have attempted to investigate the factors that influence the performance of the diversification strategy and have emphasized the importance of conducting a comprehensive analysis before implementing this strategy. Even though it can benefit a company to utilize its resources or competence more efficiently and create synergies between adjacent industries, it could also adversely affect each business's performance or profitability. Nevertheless, the diversification strategy has been recognized to significantly help companies grow and utilized in various industrial domains (Hafner, 2021; Khatib et al., 2021; Mendoza-

Abarca & Gras, 2019; Mulwa et al., 2015).

2.2 Business diversification strategy in the telecommunication industry

Generally, telcos have grown by operating wired and wireless network connectivity and data transmission. However, the telecommunications market has become saturated with no further subscriber growth, while the demand for advanced networks and investment in it has continued to rise. This market situation has deteriorated the profitability of telcos telecommunication businesses (Fonseca, 2019). Furthermore, telcos may face another threat from situations in which the structure of mobile networks has shifted from hardware-based to software-based, thereby increasing the negotiating power of network equipment companies with related software technology, or in which global tech companies have developed their own non-terrestrial or submarine networks. Therefore, telcos have operated diverse businesses in other industries beyond traditional telecommunication businesses to respond to the downturn of the telecommunication business and maintain their presence in the ICT industry (H-B. Kim, 2020; Li & Whalley, 2002).

Many telcos have provided Internet Protocol Television (IPTV) services leveraging their network infrastructure and Internet service subscribers. It was verified that the operation of this business has a positive effect on the overall performance of telcos, and the effect is more significant when a bundling strategy is utilized for it (Shin et al., 2015). There has also been much discussion of telcos' business activities in the Internet of Things (IoT) sector, which refers to technologies and related services that enable data sharing and communication across devices and between devices and cloud servers over networks (Jabeen & Ishaq, 2022; Yopez & Kim, 2018). In addition to the devices and services, telcos have developed private networks and provided business solutions for other stakeholders in the IoT ecosystem.

Furthermore, as artificial intelligence (AI) technology has been considered a crucial component of the ICT industry and the high capability to utilize large amounts of data through network infrastructure is essential, telcos have actively deployed their network-related capabilities and infrastructure into AI-related sectors (Balmer et al., 2020). They have not only utilized it to predict consumer demand or switching (Chen et al., 2021) and manage their network operation (Gutierrez-Estevez et al., 2019) but also introduce new services such as cyber security (Adel et al., 2021) and cloud service (El Khatib et al., 2019). In addition, some telcos have offered e-commerce services by utilizing their large pool of customers (E-J. Kim, 2020) and entered the industries such as digital healthcare, agriculture, and energy management by acquiring companies with the capability in these industries or establishing a memorandum of understanding (MOU) with them (Bloomberg, 2022; Jun, 2019; Lee & Kim, 2022; PE Hub, 2020; Sehgal, 2022). These cases and discussions of telcos' business diversification indicate that the dynamic convergences of technologies and industries within the current ICT environment have enabled telcos to explore diverse business opportunities.

On the other hand, it is also important to note that telcos may encounter unprecedented risks or intense competition with other operators outside the telecommunication industry (Wulf & Zarnekow, 2011). For example, telcos, crucial players in the local media industry through IPTV services, have faced competition with local and global Over-the-Top (OTT) service providers (Li, 2017). In this sense, it has been argued that telcos operating IPTV or other Pay-TV services should also be prepared for cord-cutting, that users cancel their existing Pay-TV service and switch to other new media services such as OTT (Crawford, 2016; Tefertiller, 2018). In addition, operating businesses less relevant to core businesses or capabilities may find it challenging to make a sufficient profit or even withdraw from it due to a lack of experience or relatively lower competitiveness.

These situations align with findings from previous studies that diversification strategies

could negatively impact a firm's performance (Liebenberg & Sommer, 2008; Vu & Ha, 2021). Furthermore, the regulatory environment may affect the aspect of telcos' business activity in a particular industry (Bauer et al., 2015; Hausman et al., 1997; Schwartz, 1984), as exemplified by that in specific industries, such as digital health, the range or level of services or products can vary depending on the type of operators or countries due to the differences in the regulatory environment (Chung et al., 2022; DLA PIPER, 2020). It means telcos should prepare for regulatory restrictions or policy support affecting their business in other industries and develop a strategy that reflects them in advance.

A literatures on telcos' diversification strategy reveals that telcos have operated businesses in many different industries to maintain or expand their influences in the ICT industry and create stable economic value (Bandyopadhyay et al., 2022; Jabeen & Ishaq, 2022; Yopez & Kim, 2018). However, there are undetected risks and disadvantages for telcos in each industry, and it is challenging to be successful in all industries. Furthermore, a high degree of business diversification can also negatively impact a firm's performance (Liebenberg & Sommer, 2008). Thus, telcos need to focus on the promising sectors, which are killer domains, and allocate their resources to these (Fonseca et al., 2019; Lee & Ryu, 2019). However, more research still needs to be done on which domains are promising from a telco's perspective and what criteria can be used to determine this. Accordingly, this study aims to identify the killer domains where telcos can create business value beyond the telecommunication business and develop the criteria for identifying it.

2.3 A Comparative case study of the Canadian and Korean telecommunication industry

This study aims to explore the killer domain for telcos' diversification strategy and develop the criteria for determining it in the context of the Canadian and Korean

telecommunication industry, and to compare the results to provide practical implications that can be applied to more diverse contexts (Mishra et al., 1996). Comparative studies of Canada and Korea have been conducted on various business-related topics, such as factors affecting the success of new product development (Mishra et al., 1996) and cultural differences in business operations (Al-Alawi & Alkhodari, 2016). Moreover, some studies provided meaningful insights by comparing the situation in the two countries related to the regulatory environment in telecommunications, broadcasting, and Internet services (Flacher & Jennequin, 2008; Wu, 2004), broadband infrastructure development (Frieden, 2005), and direct broadcasting satellite (Park & McDowell, 2005), and explaining the difference and its reasons to the regional, industrial, cultural, and regulatory characteristics of Canada and Korea. These studies revealed that it is worth comparing the two countries in the context of the telecommunications industry, and it can provide practical implications for stakeholders in other countries.

Table 1 shows the statistics of Canada and Korea regarding the report from OECD (2023). In terms of population, Korea (51.7 million) is about 1.4 times larger than Canada (38.2 million), while in land area, Canada (9,984,670 km²) is nearly 100 times larger than Korea (100,210 km²). This information indicates that Korea's population density is much higher than Canada's. Regarding the economic scale of the two countries, the gross domestic product (GDP) in Canada (USD 1.9 trillion) is slightly higher than in Korea (USD 1.8 trillion), with marginal differences. However, the GDP per capita in Canada (USD 51,987.9) is higher than Korea's (USD 34,997.8) due to the lower populations in Canada. Regarding Internet access, the portion of households reported that they have Internet in both countries is above 90%. According to the fixed broadband subscriptions, which is the penetration of fixed broadband technology that advertised a download speed of 256 Kbps or greater, the two countries are similar. However, in mobile broadband subscriptions, which is the penetration of mobile

broadband service offering speeds of 256 Kbps or more (such as high-speed packet access (HSPA) and long-term evolution (LTE) networks), Korea is higher than Canada.

Table 1

Comparative of statistics of Canada and Korea

Indicator	Canada	Korea
Population (Million)	38.2	51.7
Land area (km ²)	9,984,670	100,210
GDP (USD trillion)	1.9	1.8
GDP per capita (USD)	51,987.9	34,997.8
Internet access (% of all households)	94.2	99.7
Fixed broadband subscriptions (Per 100 inhabitants)	42.0	44.3
Mobile broadband subscriptions (Per 100 inhabitants)	80.7	157.8

Note. The land area figure is for 2020; the population figure is for 2021; the gross domestic product (GDP) figure is for 2021; GDP per capita figure is for 2021; Internet access figure is for 2020; mobile broadband subscriptions figure is Q4-2021; fixed broadband figure is for Q4-2021.

Canada and Korea have advanced mobile network technology compared to other countries. They were early adopters of commercial 4G networks, which helped drive innovations and growth in the telecommunication industry of each country. In 2020, it was reported that mobile network in Canada had the fastest internet download speeds in the world, followed closely by Korea (Fenwick & Khatri, 2020). However, there has been difference between two countries in 5G network deployment. Korea has been at the forefront of 5G deployment and has world's most extensive 5G networks. Korea's 5G has highest average download speed in the world and also is in the top tier for upload speeds, availability, and reach

(Fogg, 2022). The Korean government has taken the lead in planning for 5G technology and has played an essential role in driving cooperation among companies, institutions, and academia, as well as providing incentives for 5G deployment, enabling Korea to become the first country in the world to commercialize 5G (Masaro & Kim, 2022). On the other hand, Canada has been one of the latest countries for adoption and still has more room for improvement in coverage and penetration compared to Korea (Fenwick, 2023). Canada has the second-largest land area in the world, and it might lead them to have the highest capital expenditures (capex) for maintaining the comprehensive network connectivity among G7, Australia, and Korea (PwC, 2021). Telcos in Canada have to invest heavily in building and maintaining extensive networks, especially in rural and remote areas. These investments require telcos for significant capital expenditure. Moreover, Canada's vast geography and low population density could challenge infrastructure development. Therefore, building the necessary infrastructure to support 5G networks across a large area takes more time and substantial investment. In this sense, Canadian telcos and the government have tried to focus more on expanding coverage and improving existing 4G networks. This approach allows them to ensure widespread access to reliable connectivity before focusing on the next generation of network technology.

In both countries, the telecommunications industry has been driven by three major telcos, Bell, TELUS, and Rogers in Canada, and KT, SK Telecom, and LG Uplus in Korea. A summary of the performance of the major telcos in both countries is presented in Table 2. Canadian and Korean telcos were comparable in terms of their revenue in 2022. However, Canadian telcos have higher net income as a ratio to revenue than Korean telcos. There are also similarities and differences in the businesses each telco has entered beyond the traditional telecommunications services. For example, telcos have entered both countries' media and content and smart home and security sectors, offering related services and products. This means

that Canadian and Korean telcos recognize these sectors as effectively utilizing their network service subscribers and infrastructure and creating economic value. In addition, Canadian telcos have been less active in entering new industries than their Korean telcos, except TELUS, which has entered the agriculture and digital health industry. On the other hand, Korean telcos are more proactive in diversifying their business by entering areas such as cloud, commerce, telematics, and VR/AR, in addition to media content and smart home & security.

Table 2

Comparative of Canadian and Korean major telcos' performance and business domains

Country	Company	Revenue	Net income	Market Cap
Canada	Bell Canada Enterprises Inc.	17.57	2.08	39.83
	TELUS Corporation	13.30	1.17	27.91
	Rogers communications Inc.	11.19	1.22	22.63
Korea	KT	19.59	0.99	5.91
	SK Telecom	13.21	0.72	7.83
	LG Uplus	10.61	0.50	3.60

Note. All numbers in billion US \$; Revenue and net income is from annual income statement in December 2022; Market Cap of Canadian companies is based on The New York Stock Exchange on March 17, 2023; Market Cap of Korean companies is based on Korea Composite Stock Price Index on March 17, 2023.

2.4 Research questions

The literature review identified that this strategy is crucial for companies to create value across diverse markets and to effectively make managerial decisions in their scope of business, organization, and management (Tanriverdi & Du, 2020). In addition, this study found similarities and differences between geology, population, industrial environment, and telcos in Canada and Korea. With this concept of business diversification strategy in the telecommunication industry, this study investigates the killer domains for Canadian and Korean telcos and examines the differences between them. It is expected to provide an academic contribution by expanding the scope of the research regarding the business diversification strategy in the telecommunications industry and practical implications for telco's decision-making regarding business diversification, and the opportunity to discuss the government's role in supporting the telco's sustainability in the current ICT industry. Moreover, it offers an opportunity to discuss the government's role in supporting the telco's sustainability in the current ICT industry. Therefore, this study will propose a model with criteria to evaluate the domains and determine the priority for justifying investment and development. The specific research questions are below:

RQ1. What would be the most important criteria for prioritizing domains for telcos' business diversification?

RQ2. What would be the killer domains for Canadian and Korean telcos' business diversification?

3. Methodology

3.1 AHP model for exploring the killer domains to create telcos' new value

To explore the Canadian and Korean telcos' killer domain for business diversification, this study adopted the analytic hierarchy process (AHP) method. AHP is a structured technique

for analyzing complex problems (decision-making) based on mathematics and psychology (Hassan et al., 2013; Liu et al., 2020; Saaty, 1985). Specifically, AHP is a method that stratifies the elements to be considered in decision-making into main and sub-criteria, finds the relative weight of each criterion through a pairwise comparison, and then evaluates and ranks each alternative (Wind & Saaty, 1980). Since AHP has several advantages, including the (cost and time) efficiency of group decision-making, an equitable representation of individual opinions, and the ease of application to problems that are difficult to quantify, it is widely used in industry and academic areas such as administration, economics, politics, and management (Vaidya & Kumar, 2006).

Considering these advantages and characteristics, several studies showed that AHP could be utilized to achieve a variety of research objectives (Vaidya & Kumar, 2006). For example, Zhang and Zhang (2014) attempted to identify the biotechnology industry's most prospective technologies by means of the firm's internal and external opportunities and threats as the main criteria. He and Zhu (2022) examined the priority of regional strategic emerging industries with criteria such as the life cycle of the industry, degree of interplay between industries, degree of industrial agglomeration, industrial development effect, and industrial innovation capability. Yin (2016) analyzed the aspects of a firm's business diversification strategy regarding the criteria, such as new and existing products and markets, based on Ansoff's Matrix. In particular, it was used in the study to identify the priorities of important alternative business models of Korean telcos and provided significant results (Lee & Ryu, 2019), so it could be a suitable method for this study to identify promising industries for business diversification of Canadian and Korean telcos and compare these.

3.2 Criteria

Companies' relative advantage and performance in new markets depend on leveraging their capabilities and core resources (Chatterjee & Wernerfelt, 1991; Porter, 1985). In addition, the business's cost and benefit are fundamental elements for the company for setting a direction of the strategy and managing the business portfolio. Therefore, this study hypothesizes that telcos should consider three main criteria for exploring the killer domain for their business diversification: Resource fit, expected benefit, and the expected cost. Resource fit comprises three sub-criteria, network infrastructure and technology, data and analytics, and customer base. The expected benefit includes market opportunity, synergy with existing business, and social and environmental value, and the expected cost is broken down into the cost of investment and risk. Specific discussions of the main and sub-criteria are below.

3.2.1 Resource fit

Resource fit refers to how well a firm's core resources and capabilities, and technologies to leverage them strategically fit the industry (Harmancioglu et al., 2009; Liu et al., 2011). Porter (1987) argued that for a firm to create substantial value by entering a new market, the resources and competencies that are crucial in the existing market must also be utilized effectively for business in the new market. In the ICT industry, where telcos operate new businesses, they may compete and cooperate with non-telecom companies as well. As such, telcos should focus on industries where they can leverage their core resources, which are telco-specific and challenging for competitors to emulate, as much as possible, to operate a competitive business and build profitable relationships with partners (Cooper et al., 1997). In this sense, telcos have actively utilized their resources such as network infrastructure, data, customer base to capture the new market opportunities in diverse domains such as cloud, e-commerce, media contents, and fintech (Bandyopadhyay et al., 2022; Siddiqui & Siddiqui,

2020; Soares et al., 2015). It shows that telcos should consider how well their network infrastructure and technology, data and analytics, and customer base fit to the industries in terms of business diversification (Lee & Ryu, 2019).

Network infrastructure is the backbone for transmitting voice, data, and video; it encompasses the hardware and software resources such as routers, fiber optic cables, base transceiver stations, firewalls, servers, storage systems, and internet data centers that enable communication and network operation or management. As diversified digital services, content, and devices in the ICT industry are sophisticated, the network capacity required to operate them also increases (Lee et al., 2017; Pallis & Vakali, 2006). In addition, as digital transformation actively takes place in many aspects of daily lives, individuals, society, and industry become more dependent on network (Schwertner, 2017). In response to this circumstance, telcos have invested in infrastructure to provide the network with high-speed, -reliability, and -security and low-latency, as well as developed related technologies such as mobile edge computing (MEC) and network slicing to enable networks to be utilized more efficiently for services or systems that generate a large amount of network traffic (Hu et al., 2015; Li et al., 2017). Thus, network infrastructure and technology and the capability to utilize them are distinctive resources of telcos; telcos are anticipated to be more significant players in industries where these resources are considered more valuable.

Data and analytics are essential for firms to have a competitive advantage and create diverse business values in the ICT industry. Chen et al. (2012) argued that companies could analyze the collected structured data to understand consumer preferences and needs and even find the new business opportunities, and this mechanism can be applied to various sectors, including e-commerce, healthcare, security, and e-government. Telcos collect data from various sources, including mobile devices, customer profiles, service usage and product purchases, contracts, geographies, and networks, and actively use it to optimize their services

and technologies and provide a better customer experience (Gordon, 2022). Moreover, as telcos operate IoT services and devices, the scope and depth of collectable data have expanded (Zahid et al., 2019). Telcos have actively invested in developing AI and machine learning technologies to transform these data resources into business value. There are regulatory, security, and privacy challenges for telcos to create business value from their data and analytics capabilities (Malaka & Brown, 2015). However, telcos will be able to create more value if they find industries where there are less restrictive or if they can overcome these restrictions through cooperation with other companies or government. Therefore, as Lee & Ryu (2019) found that data is the most important resource for the telco to consider when deciding on alternative business models, data and analytics could be significant in a telco's business diversification.

Customer base and the ability to utilize it to create business value have become increasingly critical in the ICT industry, where diverse technologies and services converge without boundaries (Ofek & Sarvary, 2001). In particular, Manral & Harrigan (2018) emphasized the importance of customer-centric diversification in multi-business firms' business strategy, which could reduce costs and have a competitive advantage in the market by providing the products or services considering the needs and preferences of existing customers. It implies that when companies enter a new market and operate a new business, they can leverage their existing customer base to make better performance, and it should also be an essential factor for telcos in deciding the industry to enter or the direction of business strategy. From this perspective, telco's wireless and wired telecommunications services customers can be considered an important resource they can leverage when entering new industries. In addition, the various enterprises and government institutions that use the services and products related to their network are also important pillars of their customer base. In this sense, in terms of telcos' business diversification, they need to focus on the industry that has more opportunities to leverage their current customer.

3.2.2 Expected benefit

The benefit is essential in determining the direction of corporate strategy and management (Roh et al., 2009). Companies executing a business diversification strategy aim to obtain benefits that mirror their needs (Reed & Luffman, 1986). By diversifying the business portfolio, companies would expect various benefits such as risk reduction, resource utilization, corporate value or performance growth, and business synergy (Le, 2019; Li & Kami, 2010). The scope and importance of the benefit that a company may drive from operating a business can vary depending on industry and corporate characteristics. In this sense, telcos need to identify the industries where they can benefit substantially from business diversification. Furthermore, it is necessary to assess the industry based on its expected benefit and focus on it with priority. This study proposes three core benefits that telcos should consider in business diversification: Market opportunity, synergy with the existing business, and environmental and social value.

Market opportunity refers to the extent of profit a company can expect to make within the market. Market opportunities are determined by diverse factors such as industry maturity, market size, structure, degree of competition, prospects, and regulatory environment (Lien & Klein, 2009; Maresova, 2020). Market opportunity is also a significant factor that drives companies to move into new industries (Stimpert & Duhaime, 1997; Su & Tsang, 2015). This means that if a company deems it no longer finds a significant market opportunity in its primary industry, it can enter a new industry by diversifying its business to create another market opportunity. Within the telecommunications industry in many countries, there is no significant growth in subscribers to current wire and wired telecommunications services. Furthermore, the intensity of regulation in the telecommunications industry is relatively higher than in other industries. The market opportunity in the traditional telecommunication industry shrinks due to pressure to reduce service charges and the growing influence of mobile virtual network

operators (MVNOs) (Lotfi, & Sarkar, 2017; Parsheera, 2018). At this point, it is critical for telcos to focus on industries that are expected to have more market opportunities and prioritize and focus their resources and capabilities on them for sustainable growth. Therefore, this study proposes market opportunity as a sub-criterion of expected benefits that telcos should consider when diversifying their business.

Synergy is an effect of creating additional outputs, which are only achieved when businesses operate together, not when they operate independently (Von Bertalanffy, 1972). Also, synergy is one of the benefits that companies derive from diversifying their business portfolios (Westhead et al., 2005; Alsos et al., 2003). Synergy is more likely to be created between businesses that share similar resources and capabilities (Robins & Wiersema, 1995), and in such cases, high returns can be expected (Montgomery & Hariharan, 1991). However, coordination costs may occur in creating synergy from different kinds of businesses, and if it becomes too large, the synergistic benefit may be reduced (Zhou, 2011). In other words, telcos need a detailed view of the expected synergy as they try to diversify their business in new industries. Therefore, the study suggests that synergy, the positive effect of a new business on the revenue or growth of an existing business, would be one of the expected benefits that telcos should consider as they diversify their businesses.

Social and environmental value is the effect, object, or characteristics that can contribute to public welfare and community development in diverse aspects such as society, culture, and environment. An activity of corporate social responsibility to create this value can increase customer's trust (Iglesias et al., 2020) and loyalty (Martínez & Del Bosque, 2013) and indirectly increase corporate market value by increasing customer satisfaction (Luo & Bhattacharya, 2006). Moreover, it could positively impact on values for diverse stakeholders (Peloza & Shang, 2011). In terms of telcos, several benefits are expected by pursuing social and environmental values with their business. It improves the corporate image of the telco and

strengthens the positive relationship between customer loyalty and corporate image (Afiuc et al., 2021). Telco's high initiative in the activity for social responsibility is also motivated by the expectation of long-term profitability and sustainability (Mohamed & Sawandi, 2007). As the importance of social and environmental values increases, government may further encourage these activities through policies or regulations requiring telcos to be accountable for user protection, security, safety, and social commitment (Sutherland, 2016). In this sense, when telcos try to operate the business in a new sector, it would be essential for them to estimate the social and environmental value of the business they can create there.

3.2.3 Expected cost

When a company enters an industry and implements a business, it necessarily incurs financial and non-financial costs (Frej et al., 2021). The amount of required cost varies by industry, and affordability also depends on the company's financing ability. If the costs are expected to be higher than the benefits within a particular industry, it can be challenging for the company to achieve stable profitability. Especially in light of the burden of maintaining their existing core business of wired and wireless network service and investing in the next generation network (Grijpink et al., 2018), telcos need to analyze the expected average cost more closely for implementing a business in a new industry. Therefore, this study proposes expected cost as an essential criterion that should be importantly considered for telcos' business diversification. This expected cost can be divided into two different types of cost: Cost of investment and cost of risk.

Cost of investment refers to the monetary expense of a company incurred as it invests in elements of business to maintain or improve it. Investment is required to develop and operate innovative products and services, but it does not always guarantee higher corporate performance (Lantz & Sahut, 2005). It implies that companies should thoroughly evaluate and

decide where and how much to invest in pursuing corporate goals or purposes. The effect and outcomes of investment in the telecommunications industry have also been extensively discussed. Telco's investment is closely related to growth (Batuo, 2015), competition (Inders & Peitz, 2012), and regulation (Gentzoglanis, 2004). It is also known that investment cost should be considered an essential criterion in determining alternative business models for telcos (Lee & Ryu, 2019). It shows that investment should be analyzed, and its cost should also be considered an essential factor in the strategic decision-making process of the telco. Entering new industries and operating businesses beyond the telco's core telecommunication business requires them to invest in new technology, service development, and workforce. The higher the expected average investment cost, the riskier this can be for telcos seeking to diversify their business, so setting an affordable cost level is needed. Therefore, this study proposes the average cost of investment as an important criterion in evaluating industries for telco's business diversification.

Cost of risk is the financial and non-financial expense to manage the various risks and losses incurred through operating the business. Companies, which are incapable of imputing these costs to the price (fee) of their services or products, could experience a reduction in profitability, so this risk should be reflected when determining the direction of the business. One of the risks that significantly affect the business activities of telcos is regulation and policy (Gentzoglanis, 2004). While companies can capture diverse business opportunities in the ICT industry, they are exposed to the risk of regulations related to competition, M&A, data, or privacy (Aho & Duffield, 2020; Andrew & Baker, 2021; Tyagi, 2022; Quach et al., 2022). Moreover, companies should note that conflicts in relations with stakeholders such as consumers, employees, the community, and partners, as well as ethical issues related to business operations, can also affect business activities and managing these can be costly. Therefore, this study speculates that telco needs to identify the industry's risks for business

diversification and comprehensively analyze the short and long-term impact on their business.

3.3 The alternatives for telco's business diversification

In the AHP methodology, it is required to compare the criteria and alternatives to each other. Instead of comparing all elements at once, pairwise comparisons are conducted for each element. It indicates that when the number of criteria and alternatives increases, the number of questions for comparison also increases. Moreover, in this case, the logic for the relative importance of criteria and alternatives becomes more complex and could confuse participants who are required to compare. In this sense, some studies limited the AHP models to include three alternatives (Hwang & Kim, 2022; Kim & Kim, 2016). Therefore, this study also selected three industries that could be considered killer domains for Canadian and Korean telcos, and the process for selecting the three alternatives is as follows.

First, the annual reports of major telcos such as TELUS, Bell, and Rogers in Canada and SKT, KT, and LGU+ in Korea were reviewed. The industries in which their services, products, and devices are being offered and in which they have made investments or partnerships were listed. Any industry in which at least a telco is engaged was included in the list. Based on the listed industries, interviews were conducted with ten experts, five each from the Canadian and Korean telecommunications industries. In the interviews, regardless of their affiliation, experts were asked which industry they believe is the most important for telco's business diversification currently, by considering the country's industry, regulatory, and cultural environment and the reasons behind that view. From the interviews, security and cloud were the most frequently mentioned industries in both countries. There were also differences between the two countries. For example, in Korea, the immersive content and future mobility industries were highlighted, while digital healthcare was considered important in Canada.

To select the three industries among them, this study considered the industry's maturity

in terms of the range of services, products, and devices offered by telcos and the telco's revenue from these industries. In this regard, the cloud industry, a relatively large part of telcos' business in both countries and the mobility industry, where telcos have limited presences in the current market stage, were excluded from the alternative options in the AHP model in this study. Therefore, three industries, including security, immersive content, and digital healthcare, were decided on as alternatives to the AHP model to compare the perceptions of experts in Canada and Korea.

Security industry includes physical and cyber security services, products (devices), and related technology. Physical security services and technology include systems for access control and surveillance of private property (residence) to prevent unauthorized access, theft, or harm to the customer's tangible assets. Cyber security is more related to security consulting and solutions to prevent and respond to cyber-attacks such as DDoS and hacking, cloud environment security, personal or institutional authentication, and protection of content, online service, and network of customer. With the advent of artificial intelligence and the IoT, the distinction between these two areas is blurred, and the need for integrated security becomes increasingly important (Button, 2020). The security market is expected to grow as users' need for protection intensifies due to the changed cyber environment and increasing cyber threats targeting enterprises and institutions. In the security market, where a high level of network capability is essential (Ahn et al., 2020), telcos that have built up capabilities and experience in network security can become significant players, and it is anticipated that they can create even more value by applying this technology to their existing digital services and network infrastructure.

Immersive content refers to content that provides realistic experiences by maximizing human senses based on ICT, and related technologies are expected to be applied to a wide range of fields such as games, movies, education-related content, services, and platforms (Almeida

& Simoes, 2019; Soltani & Morice, 2020). With the development of wireless telecommunication technologies and techniques to seamlessly connect the virtual and the real environment, telcos use their network capabilities in the immersive content industry. Since immersive content requires greater data traffic and high reliability of delivery (Tang et al., 2021), telco's core resources related to network technology and infrastructure could be substantial. In response, telcos not only develop augmented reality (AR), virtual reality (VR) content, 360-degree video, 3D scanning, computer-generated imagery, interactive media, holography, and (Wearable) devices but also actively collaborate with companies with content-related capabilities and intellectual properties.

Digital healthcare refers to disease prevention, management, diagnosis, and treatment through the convergence of ICT and healthcare technologies. The digital healthcare industry, which draws on vast amounts of medical data, is a highly valuable business that has attracted the attention of numerous ICT companies, including telcos. The success of digital healthcare is expected to be determined by the competitiveness of data processing and analysis technologies based on ICT technologies such as big data and artificial intelligence (Han & Lee, 2021). In this regard, telcos build a healthcare environment by offering user-based healthcare services such as mobile healthcare, telemedicine, and personalized healthcare, including addiction treatment, rehabilitation, and chronic disease management, and adding health-related functions to existing devices. Furthermore, related technologies have been applied to IoT services and devices to care for vulnerable groups such as the elderly, people with disabilities, and children (Na et al., 2023). While the industry faces limitations and regulations that need to be addressed, digital healthcare is also an industry where telcos are expected to create new value, as perceptions of telemedicine have changed after COVID-19 (Pandya et al., 2022).

Based on the discussion of criteria and alternatives for telco's business diversification, this study proposes the AHP model in Fig. 1. The First layer comprises three main criteria –

resource fit, expected benefit, and the expected cost. Each main criteria have two or three sub-criteria and there are eight sub-criteria in the second layer. The first main criterion, resource fit, includes the network infrastructure and technology, data and analytics, and customer base. The expected benefit, the second main criterion, consists of three sub-criteria, market opportunity, synergy with existing business, and social and environmental value. Expected cost includes two sub-criteria, cost of investment and cost of risk. In the third layer, there are three promising industries for Canadian and Korean telcos' business diversification, security, immersive content, and digital healthcare.

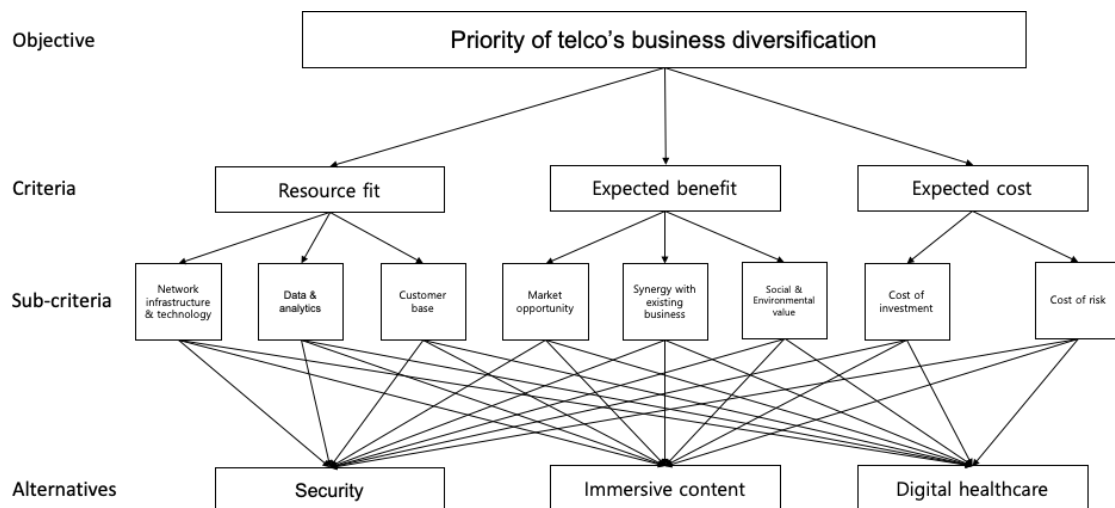


Fig. 1. AHP model for priority of telco's business diversification

3.4 Data collection and analysis

The proposed AHP model was tested through an online survey. The survey was conducted in May and June 2023 via an online survey developed by researchers of this study. A total of 26 participants in Canada and 27 in Korea completed the survey. The participants consisted of telecommunication industry experts in Canada and Korea. They were carefully selected based on their current career and research or work experience in the

telecommunication industry.

Table 3

Background and the number of participants in Canada and Korea

Affiliation	Canada	Korea
University	6	2
Research institution	1	3
Government	5	3
Telecom company	11	14
Specialty	Canada	Korea
Research	1	3
Technology/Development	1	1
Sales	-	2
Marketing/PR	-	4
Policy/Regulation/Legal	16	4
Strategy/Planning	5	8
Experience	Canada	Korea
Less than 10 years	-	2
10~20 years	9	10
More than 20 years	14	10

MatLab, a technical computing language software, was used to analyze the collected data from the survey, and the computation code was adapted from Kim and Nam (2014). The AHP methodology does not include all of the collected data in the results but rather assesses the consistency of each participant's responses through a consistency ratio (CR) and only includes data from participants whose CR value exceeds a certain standard. In general, CR values less than 0.1 are presumed to ensure the consistency of individual responses.

Nevertheless, in some cases of social science research, a CR between 0.1 and 0.2 is also accepted, considering the challenges of ensuring independence between hierarchies and participants' lack of comprehension of the AHP method (Saaty, 1985; Wind & Saaty, 1980). As a result of calculating and assessing the CR value of 26 participants in Canada, 17 participants' CR was less than 0.1, and six were between 0.1 and 0.2. Among 27 participants in Korea, 13 participants' CR was less than 0.1, nine were between 0.1 and 0.2, and five were over 0.2. Consequently, 23 responses in Canada and 22 in Korea with a CR below 0.2 were utilized for the final data analysis. The backgrounds of those participants are shown in Table 3.

4. Result

4.1 Criteria weight

As reported in Table 4, in Korean cases, the expected benefit was found to be the most crucial criterion in the first layer of the model, showing the highest priority weight (.432), followed by resource fit (.408). Expected cost was the lowest main criterion (.160). In Canada as well, the expected benefit was found to be the most crucial main criterion, with the highest priority weight (.446), followed by resource fit (.349) and expected cost (.205). Regarding the sub-criteria of resource fit, the score of the customer base was found to be the highest (.458) in Korea, followed by data and analytics (.294) and network infrastructure and technology (.248). In Canada, however, network and infrastructure and technology (.441) was most important in resource fit, followed by data and analytics (.285) and customer base (.274). In terms of expected benefit, the score of market opportunity was the highest (.481), and synergy with existing business was the second (.376) in Korea. Meanwhile, social and environmental value had the lowest score (.143). In Canada as well, market opportunity (.455) was of the highest importance, followed by synergy with existing business (.378) and social and environmental value (.167). Within the expected cost, two sub-criteria had a wide score gap in Korea. The

cost of investment (.737) had much higher than the cost of risk (.263). In Canada, however, the gap was smaller between the cost of investment scored (.524) and the cost of risk (.476).

Table 4

AHP criteria weights and ranks in Canada and Korea.

Criteria	Weight (WM)		Sub-criteria	Score (S)		Weight (WS)		Rank	
	Canada	Korea		Canada	Korea	Canada	Korea	Canada	Korea
	Resource fit	.349		.408	Network infrastructure & technology	.441	.248	.154	.101
			Data & analytics	.285	.294	.010	.120	5	4
			Customer base	.274	.458	.096	.187	7	2
Expected benefit	.446	.432	Market opportunity	.455	.481	.203	.208	1	1
			Synergy with existing business	.378	.376	.168	.162	2	3
			Social & environmental value	.167	.143	.074	.062	8	7
Expected cost	.205	.160	Cost of investment	.524	.737	.107	.118	4	5
			Cost of risk	.476	.263	.098	.042	6	8

Note: $W_S = W_M \times S$

The weights of eight sub-criteria are calculated by multiplying the main criteria weights and the score of each sub-criteria. It was shown that market opportunity (.208) was the most important sub-criterion in Korea, followed by customer base (.187), synergy with existing business (.162), and data and analytics (.120). Cost of investment (.118) and network infrastructure and technology (.101) were the fifth and sixth-ranked sub-criterion. Lastly, social and environmental value (.062) and cost of risk (.042) were the two least important sub-criteria. In Canada, market opportunity (.203) was the most important sub-criterion, followed by synergy with existing business (.168), network infrastructure and technology (.154), and cost of investment (.107). Data and analytics (.010) and cost of risk (.098) were fifth and sixth. Customer base (.096) and social and environmental value (.074) were ranked seventh and

eighth.

4.2 Priority of alternative

As sub-criterion scores are shown in Table 5, in Korea, the cost of investment (.518), network infrastructure and technology (.471), and cost of risk (.433) were the most advantageous sub-criterion of the security industry. However, customer base (.192) and market opportunity (.258) were the two sub-criteria with the lowest scores within this industry. In Canada, the sub-criterion scores of synergy with existing business (.519) and cost of investment (.519) were ranked first and second within the security industry. In addition, compared to Korea, the customer base (.395) had high scores.

Regarding the immersive content industry in Korea, market opportunity (.400) had the highest scores, followed by customer base (.365) and synergy with existing business (.332), and social and environmental value (.171) had the lowest. In Canada, although the cost of risk (.284) and customer base (.227) had high scores within the security industry, the scores of this industry regarding all sub-criteria were lower than the other two industries.

In Korea, customer base (.443), social and environmental value (.419), and data and analytics (.371) had the highest scores within the digital healthcare industry, while network infrastructure and technology (.201) and cost of risk (.247) had lowest scores. In Canada, social and environmental value (.591) had the highest scores as to Korea. However, market opportunity (.510) and network infrastructure and technology (.472) had relatively high scores within the digital healthcare industry, unlike in Korea. In addition, even though scores of data and analytics (.466) ranked fourth within the industry, the scores of this industry regarding data and analytics were higher than the other two industries.

Table 5*Scores for AHP alternatives in Canada and Korea.*

Sub-criteria	Security		Immersive content				Digital healthcare					
	Score (S)		Rank		Score (S)		Rank		Score (S)		Rank	
	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea
NT	.385	.471	4	2	.143	.327	7	4	.472	.201	3	8
DA	.326	.302	6	6	.209	.327	3	5	.466	.371	4	3
CB	.395	.192	3	8	.227	.365	2	2	.378	.443	5	1
MO	.306	.258	7	7	.184	.400	5	1	.510	.342	2	4
SB	.519	.370	1	5	.177	.332	6	3	.304	.298	7	5
SE	.267	.409	8	4	.143	.171	8	8	.591	.419	1	2
CI	.519	.518	2	1	.197	.208	4	7	.283	.275	8	6
CR	.383	.433	5	3	.284	.320	1	6	.332	.247	6	7

Note: Network infrastructure & technology: NT; Data & analytics: DA; Customer base: CB; Market opportunity: MO; Synergy with existing business: SB; Social & environmental value: SE; Cost of investment: CI; Cost of risk: CR

In Table 6, the total weights of the three alternatives are reported. The total weights of the alternatives are the sum of the weights of the alternative (w_A) from all of the sub-criteria. The weights of the alternative of each sub-criterion are calculated by the multiplying of each sub-criterion weight (w_S) and score (S). Thus, the total weights of alternatives are calculated by the sum of all of weights of alternative within an alternative ($\sum w_S \times S$). In Korea, the total weight of security (.338) was marginally higher than those of the other two. Digital healthcare (.336) ranked second, and immersive content (.326) ranked third. The gap between the three alternatives' weights showed no significant difference. On the other hand, in Canada, the

deviations of the three alternatives' weights were more extensive than in Korea. The total weight of the digital healthcare industry (.417) was ranked first, and the security industry (.392) was second. The immersive content industry (.191) was the third.

Table 6

Priorities of AHP alternatives according to criteria in Canada and Korea

Sub- criteria	Weight (WS)		Security				Immersive content				Digital healthcare			
			Weight (WA)		Rank		Weight (WA)		Rank		Weight (WA)		Rank	
	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea
NT	.154	.101	.059	.048	3	4	.022	.033	4	5	.073	.020	2	7
DA	.010	.120	.032	.036	7	5	.021	.039	7	4	.046	.044	4	4
CB	.096	.187	.038	.036	5	6	.022	.068	5	2	.036	.083	6	1
MO	.203	.208	.062	.054	2	3	.037	.083	1	1	.104	.071	1	2
SB	.168	.162	.087	.060	1	2	.030	.054	2	3	.051	.048	3	3
SE	.074	.062	.020	.025	8	7	.011	.011	8	8	.044	.026	5	6
CI	.107	.118	.056	.061	4	1	.021	.025	6	6	.030	.032	8	5
CR	.098	.042	.037	.018	6	8	.028	.013	3	7	.032	.010	7	8
Total weight ($\sum WS \times S$)			.392	.338			.191	.326			.417	.336		
Rank					2	1			3	3			1	2

Note: $W_A = W_S \times S$; Network infrastructure & technology: NT; Data & analytics: DA; Customer base: CB; Market opportunity: MO; Synergy with existing business: SB; Social & environmental value: SE; Cost of investment: CI; Cost of risk: CR

Table 7 shows the results of the total weights of the three alternatives by each participant group and country. The industry group includes all the participants affiliated with telcos; the government group includes participants affiliated with government departments or institutions. Academia and research institution groups include participants affiliated with

universities or public and private research institutions.

In terms of experts in the industry, the most important domain for telcos' business diversification was security (.368), followed by digital healthcare (.316) and immersive content (.315). However, government experts perceived digital healthcare (.383) as the most important, followed by security (.346) and immersive content (.271). Experts in academia and research institutions considered immersive content (.398) the most promising industry for Korean telcos, followed by digital healthcare (.355) and security (.247).

In Canada, experts in the industry and academia and research institutions had the same priorities for three alternatives. Experts in the industry perceived digital healthcare (.417) as the most promising for Canadian telcos, followed by security (.382) and immersive content (.201). From the perspective of academia and research institutions, digital healthcare was the most promising industry (.433), followed by security (.388) and immersive content (.180).

In terms of government experts, however, the security industry was the most crucial (.426), followed by digital healthcare (.391) and the immersive content industry (.183). Fig. 2 and Fig. 3 present the overall result of the AHP model in Canada and Korea, respectively.

Table 7

Priorities of AHP alternatives according to criteria in Canada and Korea (by group).

	Security				Immersive content				Digital healthcare			
	Weight (WA)		Rank		Weight (WA)		Rank		Weight (WA)		Rank	
	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea	Canada	Korea
I	.382	.368	2	1	.201	.315	3	3	.417	.316	1	2
G	.426	.346	1	2	.183	.271	3	3	.391	.383	2	1
A&R	.388	.247	2	3	.180	.398	3	1	.433	.355	1	2

Overall .392 .338 2 1 .191 .326 3 3 .417 .336 1 2

Note: Industry: I; Government: G; A&R: Academia and research institution

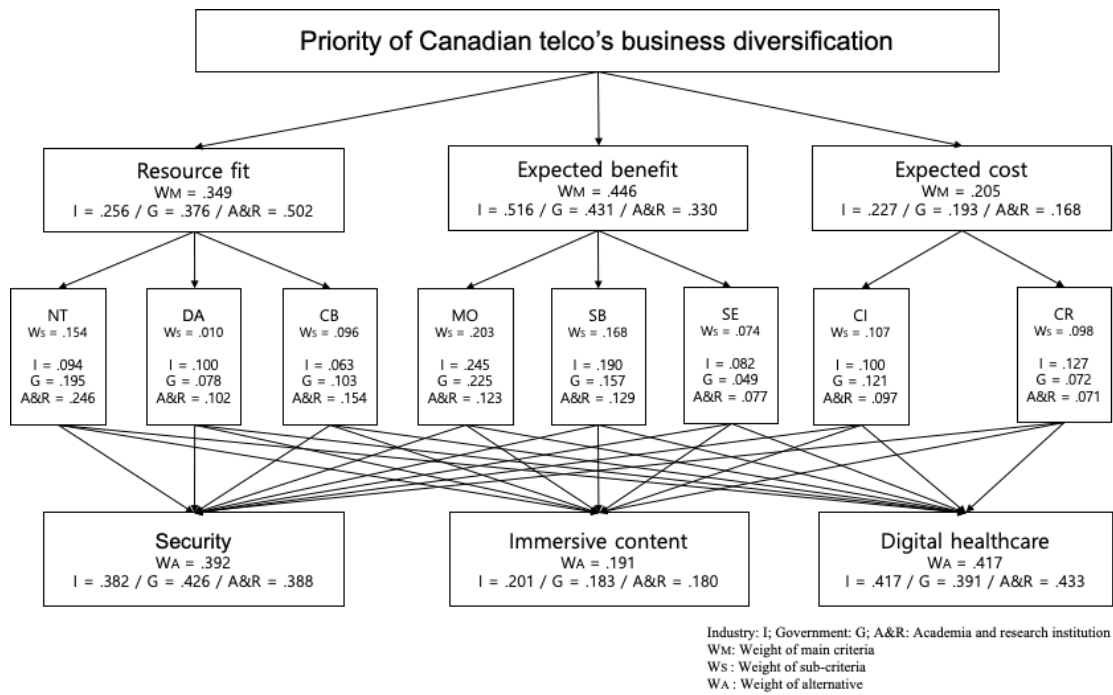


Fig. 2. Result of AHP model in Canada

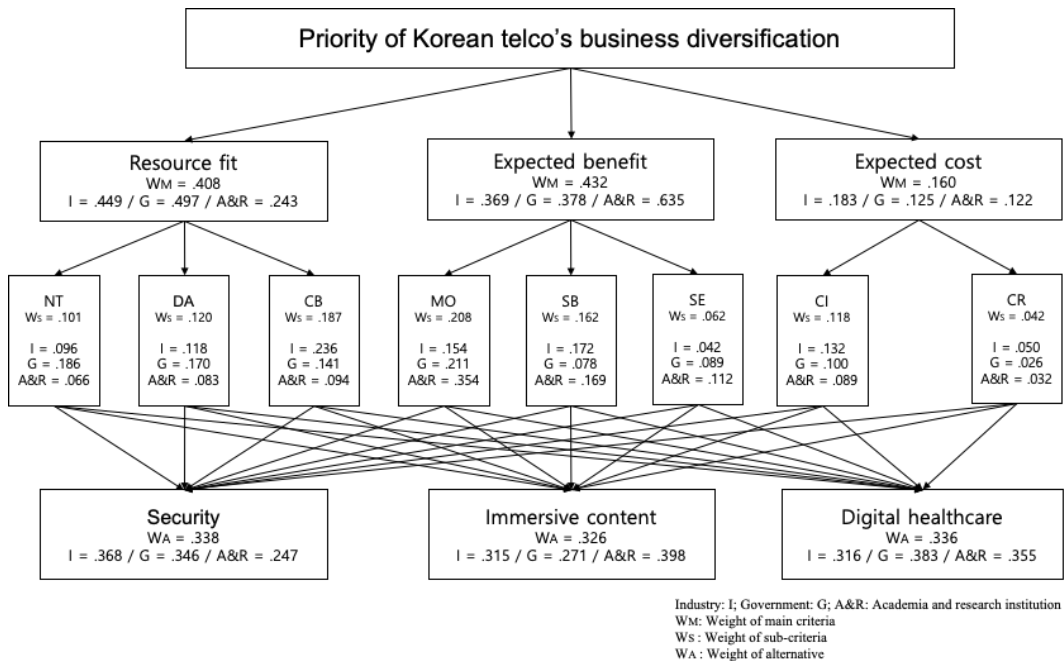


Fig. 3. Result of AHP model in Korea

5. Discussion

According to the result of the AHP analysis, it was found that expected benefit was the most important main criterion, followed by resource fit in Canada and Korea. However, the perception of the importance of expected cost had a big gap with the other two main criteria in both countries. By considering the importance of the sub-criteria, experts in both countries recognized that the most critical factors were how much the telco could have a market opportunity from there and create synergy with its existing business. While the overall importance of each criterion was generally similar across the two countries, a few criteria showed some differences. In Canada, network infrastructure and technology were considered important factors for business diversification, while not in Korea. In addition, the customer base was an important factor in Korea, whereas it was less important in Canada. These imply that Korean telcos, which have a relatively large number of customers, should actively devise a strategy to utilize their diverse customer base in their business diversification. On the other hand, experts in Canada recognized that Canadian telcos should leverage their unique resources as telcos - network infrastructure and technology - to do business in other industries. This suggests that in Canada, where the land area is much larger, the value of connecting customers across regions through the network could be more significant than in Korea, and telcos need a strategy that focuses on creating value based on that.

While the survey results from Korean experts did not show a significant difference in the perception of alternatives, the security industry had the highest weight. It was also recognized as a second important industry in Canada. Notably, among the three alternatives, the security industry had the least differences between countries regarding scores of sub-criteria and weights of alternatives. From both countries, this industry received high scores in cost of investment and risk and synergy with existing business. Especially from Korea, it, received

high scores in network infrastructure and technology and social and environmental value. It shows that experts in Canada and Korea have similar perceptions of the security industry's possibilities, challenges, and benefits. As information, assets, and businesses have been digitized disruptively, efficiency and convenience have increased in many aspects of society and industry. Moreover, advanced IoT technologies are being applied to diverse sectors such as homes, stores, and factories, and many parts of them are being automated and unmanned. Nonetheless, these circumstances have exposed them to further security-related issues and risks, and the public demand for more robust security methods to address them has also been more significant. In this digitized daily life and industrial environment, telcos are expected to be competitive players who can provide higher-level security services by leveraging their network, AI, and IoT technologies.

Some sub-criteria such as data and analytics and social and environmental value had high scores in digital healthcare industry of both countries. The core competitiveness of the digital healthcare industry is the acquisition and utilization of (medical) data. Experts might anticipate that artificial intelligence technology capabilities, which would be crucial to the digital healthcare industry, can be essential in analyzing massive amounts of (medical) data and providing (personalized) healthcare services. In particular, a wide range of social value could be created by expanding digital healthcare services into the care for vulnerable groups in society, such as kids, seniors, and disabled people and even for pets. Furthermore, in Korea, this industry had low scores in network infrastructure and market opportunities, while it had relatively high scores in Canada. In the Korean digital healthcare industry, there are still more regulatory risks and limitations, in contrast to Canada, where diverse digital healthcare services, such as virtual care or online prescription requiring a stable network connection, are relatively unconstrained. These circumstances and perceptions of the industry also could be related to the differences in medical systems in the two countries. In Canada, most medical

services are provided for free to the public. However, Canada's public healthcare system has been criticized for its low quality and administrative inefficiency. In particular, low accessibility to medical services for people in rural areas and a low home-doctor ratio are crucial issues in Canada that need to be addressed. On the other hand, Korea has a comprehensive national health insurance system, and the public benefits from high accessibility of medical facilities and a relatively low-cost burden for medical services. These differences in medical systems could have influenced the perception and demand of industry and the degree of regulation.

Even though only market opportunity showed a distinct advantage over other industries, and it had the lowest scores in cost of investment, and social and environmental value, the immersive content industry was rated fairly well overall in Korea. In Canada, however, this industry received the lowest scores across all sub-criteria. Korean experts may recognize that immersive content-related services and technologies can be applied to various sectors, including games and education, and that there is an immense market opportunity for Korean telcos to attract a diverse consumer segment. However, there was a perception that for telcos to have a relative advantage in this industry, they would need to invest significant financial resources in competing with global content and platform companies. It is expected that Canadian experts perceived the industry as difficult for telcos to compete in, given that global players from the U.S. have already invested heavily in the sector and have built up a strong presence in the global market, especially in North America. This suggests that the industry is less promising for Canadian telcos regarding resource fit, benefits, and costs.

6. Implication and conclusion

Based on the discussion, this study provides several implications for telcos to create value through business diversification strategies. First, in Canada and Korea, the security

industry was perceived as an important domain for telcos' business diversification, where telcos are expected to utilize their core resource, network infrastructure and technology effectively. Moreover, it is expected that telcos can enhance the competitiveness of existing businesses by increasing the level of security and customers' trust in the service with more sophisticated security technology. This high level of synergy and network infrastructure utilization may indicate that this industry is highly relevant to telcos' core business. Therefore, given that previous studies on business diversification showed that conducting business in relevant sectors positively impacts firm performance (John & Ofek, 1995; Vu & Ha, 2021), the security industry should be recognized as an essential industry for telcos seeking to diversify their business. In particular, telcos should consider cooperation with security firms as a key strategy in this sector. By combining the traditional security systems and infrastructure of security firms with the network technology of telcos, telcos can offer more advanced security services and products to more diverse customers. In Canada, TELUS' acquisition of ADT Canada (TELUS, 2019) and Bell's acquisition of AlarmForce (Bell, 2018), and SKT's acquisition of ADT Caps in Korea (Sharma, 2020) are strategic moves that could create these effects.

Second, the COVID-19 pandemic has significantly accelerated the proliferation of digital healthcare in Canada and Korea. In this sense, from the result of the AHP model of this study, digital healthcare was perceived as an important market for telcos in both countries, considering that they can effectively leverage their data-related ICT technologies and create significant social value (Siriwardhana et al., 2021). In Canada, where the digital healthcare market is relatively less regulated and a wide range of services are available, telcos have utilized their network capabilities to provide the services such as virtual diagnosis, prescription, and medical information management. In Korea, however, most of the operators' business, including telcos, is limited due to relatively higher regulations. This implies that telcos' strategies within this industry should be set differently based on the regulatory environment

within each country or the context. In highly regulated environments for digital healthcare business, telcos need to position themselves as fruitful partners by leveraging their existing customers and the data they have accumulated over time to create business value with beneficial cooperation. In addition, they could focus more on providing digital health solutions that increase the operational efficiency of medical organizations and institutions or offering prevention and care-based services that are converged with ICT technologies, rather than diagnosis or treatment, to existing diverse groups of customers, including kids and seniors. As the industry matures and the network's value becomes more important in the industry, telcos can then utilize their experience and network capacity to increase their presence in the markets to create more business value. In order to become a more viable player in the industry, telcos may need to spin off their business units to become more independent and flexible and cooperate with other players with experience and capability in the medical sector. This is evidenced by TELUS in Canada, which operates a digital healthcare business through a division, TELUS Health and acquired LifeWorks providing digital and in-person medical solutions (Korstrom, 2023), and SKT in Korea, which has established a joint venture, Inviteshealthcare, with Seoul National University Hospital (Kwak, 2020).

Lastly, even though immersive content was perceived as the least important industry for Canadian and Korean telcos' business diversification, experts in Korea believed that this industry would be a significant opportunity for telcos to create value beyond the telecommunication business. However, in the current stage in both markets, network infrastructure and technology, the core resource of telcos, have yet to be recognized as critical. Moreover, for telcos, fierce competition with local and global tech companies is inevitable in this sector, and further investment in immersive content expertise is required to outperform them. In order to be a competitive player in this industry, it is important to develop a platform that can deliver a new dimension of experience by combining various services, content, and

technologies. This is relevant to the current situation in Korea, where three major telcos offer immersive content platforms, Iland, Genie Land, and Uverse, respectively, based on their customer base. In addition, operators should strive to develop killer content or business models in this sector to ensure stable profitability and provide users with a satisfying experience in new content environments.

The results of this study show that even for the same industry, telcos' business strategies can vary depending on each country's policy and regulatory environment. This means that the role of the government is critical for telcos, which play an important role in the digital economy, to create value beyond the traditional telecommunications business and maintain their presence in the global ICT industry. In this regard, this study provides policy implications regarding the telcos' business diversification based on the discussions.

First, the digital healthcare market has continued to expand in size and importance after COVID-19. However, the Korean market is still constrained by regulations that limit telcos and startups from creating value in the industry. On the other hand, global tech companies are building their capabilities in a more flexible regulatory environment. Under these circumstances, the government needs to facilitate the market so that local companies can accumulate experience and build capacity based on the local market. If the government lowers the barriers to utilizing (medical) data and attempts to deregulate services, it is expected that more diverse players will be able to innovate in the market. In addition, cooperation and communication between key ministries or institutions managing the industry are needed to establish clear guidelines for the diverse stakeholders. It would be helpful for preventing overlapping regulations within the industry which is still in its early stages and require more rooms to make innovation from diverse players. In addition, not only in Korea but also in Canada, where a wider range of digital healthcare services have been deployed, there is still disharmony between industry and medical organizations and institutions. Such conflicts can

end up being a significant risk for operators and negatively affect the public welfare. Therefore, there is a strong responsibility for the government to take a role in reconciling the conflicts between stakeholders in this industry. Furthermore, it is necessary to conduct fundamental research by cooperating with industry, academia, and government to understand the digital healthcare industry with high social value and recognize its importance.

Second, Korean content providers have made meaningful achievements in the global content market by creating compelling content. However, it will be difficult for the company to create global-level capabilities through independent efforts in the immersive content industry. This is because providing a compelling consumer experience with immersive content and related devices requires an intense investment of resources in technology, content, and platform. Therefore, governments should consider creating collaborative models for content, platform, network, and device operators to create more synergy within the industry. It is also necessary for the government to provide practical support, such as tax exemptions and infrastructure support, and continue R&D investment to foster a specialized workforce in the field.

Business diversification into diverse industries is an important strategy for telcos to create business value. In light of this, this study attempts to identify the killer domains for telcos' business diversification strategies in the context of the Canadian and Korean telecommunications industries by conducting an AHP analysis through an expert survey. The results confirmed that it is essential for telcos to create value by organizing an optimal portfolio that takes into account resource fit, benefits, and costs. In addition, telcos can create business value and enhance existing telecommunication services by focusing on industries where their core resources - network infrastructure and technology - are utilized as necessary. However, the promising industry might vary depending on each country's regulatory and competitive environment, so telcos should thoroughly evaluate each industry before deciding which sector

to focus on.

In addition, it is necessary to read the values that governments and industries seek from specific industries and reflect them in business strategies. From the discussion and results of this study, it is seen that the Korean telcos and the government intend to enter and develop emerging industries and dominate the market promptly. This is expected to be driven by a national concern to protect the local market from global operators. On the other hand, the Canadian industry seems to prioritize businesses that can lead as many public as possible to the utmost level of convenience in their daily lives rather than those sectors that require heavy competition or investment to be the leading player in global market. Also, the government's regulatory and policy stance is closely tied to that objective. In this sense, telcos need to consider staying abreast of these national policies and tendencies within the telecommunications and adjacent industries, where value creation through independent initiatives could be limited.

However, this study examined the perceived importance of each industry for telcos' business diversification by group and found a need for more harmonization of perceptions and understanding across groups in both countries. Therefore, industry, government, and academia should discuss the direction of the industry and business and create synergies through the discussions for the competitiveness and sustainability of telcos, which are the backbone of the national digital economy. Furthermore, as this study provided meaningful findings by comparing two countries leading the global telecommunications industry, Korea and Canada, it would be worth attempting comparative research between countries with similarities and differences and establishing a foundation for benchmarking or cooperation in many areas of the industry.

This study has several limitations. The number of participants in the survey itself is not enough to guarantee that the results of this study are representative of the views of experts in

each country. However, this study used data from participants from a variety of organizations, including major telcos, government institutions, universities, and research institutes in each country. In addition, the participants were selected from a pool of people who were considered to have a sufficient understanding of the telecommunications industry, and more than 50% of the participants had more than 20 years of telecommunications-related work or research experience. However, it would be meaningful to explore the perceptions of experts with a larger sample in a future study. Furthermore, it would be worthwhile to conduct a similar study with data from customers to find out how their perceptions differ from those of experts. Second, telcos have other alternatives to diversify their business besides the three alternatives explored in this study. For example, experts in each country mentioned that cloud services and the future mobility industry as promising. Moreover, there are limitations to applying the findings from the two countries to the context of other countries. In this sense, further study could be valuable with the developed decision-making model in this study by applying it to other industrial or national contexts with different alternatives.

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