

## Corporate Digital Competencies for Digital Banking Innovation: Case Studies in Indonesian Banking Sector

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### Abstract

Banking sector in Indonesia has enormous potential to grow. The large unbanked population, quick mobile & internet penetration, and advancement of digital technologies have propelled a fast-moving trend toward digital banking innovation. Banks and other financial service providers in Indonesia are anticipating this trend by preparing a roadmap to convert their business models, products, and services into full or partial digital financial propositions to meet the new customer's expectations. This study investigates the required digital competencies at a corporate level that banking organizations need to prepare prior to stepping into digital transformation. Four Indonesian banks with different states of digital transformation have been selected as case studies for this qualitative study. This is an ongoing study, nevertheless, some initial findings and observations will be presented. While several previous research have discussed some parts of this study, the authors believe that no past research presented the whole set of corporate digital competencies, especially in the digital banking context. The outcome of this study is expected to be of value to academics as well as to businesses.

**Keywords:** Digital banking innovation, digital competencies, Indonesia, case studies.

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### Introduction

With an aggregate asset of more than IDR 9,824 trillion from a total of 107 commercial banks in Indonesia (OJK, 2021) and a large number bankable unbanked population of 113 million, the banking industry is deemed as one of the most prospective business sectors in Indonesia (Mehrotra et al., 2015). However, banks are facing increasingly complex regulations (Gai et al., 2019), growing risk and operation challenges (Dewi, 2021), disruptive technologies,

shrinking margins, and more intense market competition (de Souza Castor, 2022). More than ever, banks are under huge pressure to maintain and grow their market share.

Banking services were traditionally delivered through physical facilities (Broby, 2021) such as branches, booths, ATMs, and kiosks, so banking was location-and time-bound (Asmudhan et al., 2022), (Kaur, Ali, and Al-Emran, 2021) as customers had to physically present in those facilities during banking operation hours. Today, customers want to access bank services anytime, anywhere, without the need to visit a branch for every single transaction they do (Jana, Khedkar, and Khedkar, 2021), this tendency has grown even stronger during and post COVID-19 pandemic (Ramaswamy et al., 2021). Customers are expecting banking activities to be transformed from brick to click (Pavithra, 2021). This is the main reason digital banking emerged.

Digital banking is about automating and digitalizing banking processes and services to offer a much better customer experience and maximize growth potential. Kaur, Sharma, and Siddiqui (2020) argue that applying digital technologies such as Artificial Intelligence to banking services has improved customer experience and also helped banks to grow and expand. A survey on digital banking in Indonesia by PwC (2018) reported that digital banking has turned mainstream with around 66% of survey respondents indicating that they have developed a digital banking strategy as part of corporate strategy. A similar study from Vander (2019) also suggests that digital transformation is one of the key elements for firms to build and sustain their corporate strategy in the new digital economy.

Despite *digitalization* and *innovation* have become commoditized keywords that are often regarded as the main characters of the new and modern banking model, there is a major issue that needs to be addressed to support digital innovation for competitiveness in Indonesia, namely management of knowledge within the banks' organization as knowledge is a fundamental basis of competition (Zack, 1999), (Grant, 1996). Since knowledge is a basic component of a competency (Hogg & Vaughan, 2005), this implies that banking sector is lacking prescribed competencies that they need to develop and nurture to advance their digital innovation agenda. This study aims to identify a set of corporate digital competencies to

support digital banking innovation through multiple case studies in some Indonesian banking organizations.

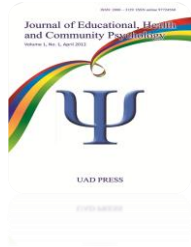
### ***Needs for Innovation***

Innovation is a complex concept that encompasses human, organizational, and process aspects of an organization to improve performance through production efficiency and reducing costs (Schumpeter, 2000). Brynjolfsson & McAfee (2012) emphasize that organizational innovation is crucial to winning the ever-challenging competition in the 'machine' era. Willingness to innovate is the main proxy to the company's propensity for change, driven by the exploitation of new ideas and new technology to create a competitive advantage (Harryson, 2008). The advancement and use of technological solutions for product and service innovation are inevitable to meet customer needs in the digital era. Digital innovation is defined as the creation of market offerings, business processes, or models that result from the use of technology (Nambisan et al., 2017)

With these in mind, for banks to survive and advance with the market competition it is imperative that they need to be innovative to expedite the new product/service delivery and to improve customer experience, while on the other side, continuously driving efficiency, improving productivity, and overcome the increasing overhead costs to comply with regulations, whether they are from the local regulators or to respond to global industry requirements. Overlying with the context of digital banking trends, digital innovation has become essential for banks to survive and grow. Nylén & Holmström (2015) suggest the following areas to be considered in building a managerial framework for digital innovation strategy: user experience, value proposition, digital evolution scanning, skills, and improvisation.

### ***Corporate Digital Competency***

To support the digital innovation agenda, banking leaders have to understand the required digital competencies at a corporate level, across human, process, and technological aspects.



Particularly on competencies that are relevant to the digital environment that the business lives in.

### ***Human Competency***

European Union has included digital competency to be part of the eight key competencies for lifelong learning. Personal digital competence comprises confidence, critical, and responsible use of digital technology to achieve various goals related to study, work, and participation in society (The Council of the European Union, 2018). According to Ferrari's DIGCOMP framework (2013), there are five areas of human digital competence. The first area is Information, which consists of identifying, storing, organizing, and analyzing digital information, including interpretation of its relevance and purpose. The second area suggested in the DIGCOMP framework is Communication, including any means of digital communication, including sharing resources through online media, collaboration through digital devices, and cross-cultural awareness. The next area is Content Creation, covering digital content creation, editing, and integration with previous knowledge and content. Including applying intellectual property and licenses for the produced media outputs and contents. The fourth area is Safety, which is any means of digital protection; data, personal identities, security measures, safe, and sustainable use. The last described area of human competencies is Problem Solving, which is required to solve conceptual and technical problems through digital means, utilizing technology creatively, provide appropriate digital tools for decision making.

### ***Process Competency***

From the process competency perspective, an emerging organizational competency in the digital era is to provide, tailor, and equip its members with their learning needs. It was Peter Senge who first coined the terminology learning organization (LO) through his inspirational writing, fifth discipline: The Art and Practice of the Learning Organization (Senge, 1990), in which he defines a LO as a company that continuously transforms itself through learning and development of its members. Now, 31 years later from Senge's writing, the concept is still

relevant. Moreover, as we are now living in an era where the learning approach has evolved where learning has been made easy by various digital technologies such as AI, Big Data, and mobile apps, capabilities, and skills are developed through virtual and agile processes. Online communities share practices and solutions just like human gurus, membered by participants from around the world. The characteristics of LO have shifted from Senge's originals (LO 3.0): System Thinking, Personal Mastery, Mental Model, Shared Vision, and Team Learning into a new LO in the digital era (LO 4.0) introduced by Daly & Overton (2015) that is defined as living and learning organizational that intelligently facilitates the performance and learning its entire members, continuously transforming itself. The first characteristic of the new LO 4.0 is clarity of purpose, that is a shared vision and dialogue on how people are valued and need to adapt to support the organization's objectives. The next characteristic is holistic people experience which is a trusted brand that develops innovative, commercial, and continuous learning opportunities. Thirdly, thriving ecosystem that is a people-led system that enables its people, teams, and enterprise to thrive the learning, linked to common goals. The fourth is agile, digital infrastructure is a virtual environment that enables the exchange of knowledge, ideas, and adaptation of competence. Then continual engagement, that is a dynamic community that continually builds on the business relationship, resulting in energy, resilience, and growth. The last characteristic of LO 4.0 is intelligent decision-making, which is a robust platform using insight and performance analytics to drive organizational performance and customized experience.

Harvard behavioral scientists (Garvin et al., 2008) made some comments on why Senge's LO 3.0 vision is difficult to be realized; first, the ideas were less concrete to be implemented. Second, the concept was aimed at the senior management level while managers have no views on how learning would contribute to organizational objectives. Third, lack of standard tools for assessment. LO 4.0 tried to overcome these impedances by providing empowerment to the staff and learning ecosystem, stronger partnerships between business leaders and people leaders (L&D managers) and taking advantage of digital infrastructure to optimize the learning process.

In the later development, Antonacopoulou et al. (2019) introduced the term Sensuous Organizational Learning, which aligns cognitions, emotions, and intuitive insights by fostering critique. It demonstrates the value of “sensuousness” as a way of understanding volatility, uncertainty, complexity, and ambiguity. This concept was an attempt at completing the LO 4.0 that was previously introduced by Daly and Everton to go beyond the focus on the clarity of purpose to the common goals. LO 4.0 provides more holistic disciplines of internal and external collaboration with digital infrastructure as bridges the digital era characteristics (rise of IoT, AI, and VR) and business model in the digital era (sharing economy, collaborative consumption) through a focus on collaboration and agile organization.

Aside from learning organization, some literature has named agile process to leverage rapid technological development as one of the key process competencies toward the digital maturity era (4.0). Agile implementation not only provides flexibility and autonomy in a digital transformation process, but it also provides flexibility to redirect actions when new technologies and new opportunities come (Sjödin & Parida, 2018). Agile is an iterative process comprised of continual planning, learning, development, and early delivery of software or project. It is widely used in typical software and digital development. Camarinha-Matos et al. (2019) performed a competency analysis for Industry 4.0, in which they argue that agile is a required component of the ongoing “industrial revolution” that digitalization and interconnection of systems, products, processes, and value-chains trigger the value creations and business models.

### ***Technology Competency***

The following emerging digital technologies to support transformation in the financial industry are repeatedly reported by some scholarly papers as well as top consultant firms’ journals: Artificial Intelligence (AI), Mobility/Mobile Technology, Cloud Computing, and Big Data Analytics (Henke et al., 2020), (Marr, 2019), and (Vives, 2020). The stage of adoption of those

emerging technologies can be used to measure the digital competency level at a financial organization.

A research question emerges from the literature review, namely:

*RQ: What are the key elements of Digital Competency in Banking Organizations? Across People, Process, and Technology perspectives.*

Many past studies have discussed the required competencies to begin with digital innovation as a fragmented study of human or technological or process components of it. Fonesca & Picoto (2020) outline a set of personal competencies for digital transformation, Sjödin & Parida (2018) suggest key process competencies to support digital innovation, (Marr, 2019) and (Vives, 2020) prescribe the required technologies to support digital innovation – to mention a few, however lack of studies that have comprehensively linked and summarized all the above competency components, especially in the context digital innovation for banking organizations. This study aims to explore and determine the set of digital competencies across human, process, and technology that are essential for bank organizations as foundations for their digital innovation. The model produced from this study is expected to be a useful reference for banking leaders to start and during their digital transformation programme as well as for academic researchers for future studies.

## **Method**

This research is based on multiple case studies participated by several banks in Indonesia that have already started their digital innovation and transformation programs. Case study selection criteria are based on (a) the state of digitalization being implemented by the bank, and (b) from the view of the department appointed to be responsible for digitalization across functions or as a dedicated business unit as suggested by KPMG (2020). KPMG categorizes it from the perspective of digital roles in an organization, from a merely fragmented function scattered in multiple departments to digitalization as an integral part of doing business as shown in Fig 1. Four case study participant banks are identified to represent the four categories, respectively.

Research questions, problem identification, literature review, identification of possibly priori variables have been initially conducted to help shape the initial design of the model-building (Eisenhardt, 1989). Based on the literature review, a hypothetical corporate digital competency model with tentative variables has been formulated. From here, an exploratory study applying a qualitative approach is conducted to better understand the topic in ‘real-life’ within the four case study participant banks. A research flow is illustrated in Fig 2, following guidelines for qualitative study prescribed by Creswell (2018). Data collection is conducted through in-depth semi-structured interviews with some expert informants from the case study banks. Twelve expert informants are selected based on their roles in various departments such as Technology, Digital Products & Strategy, Human Resources, and Learning & Development. The job title of the informants varies from VP to C-level executives with more than 15 years of working experience in the banking industry. The selection of case study banks based on digital implementation’s state is expected to increase the reliability, validity, and generalizability of the result of this study, while purposive sampling technique is employed upon the selection of the informants based on their roles in the digital innovation transformation in their respective bank organization.

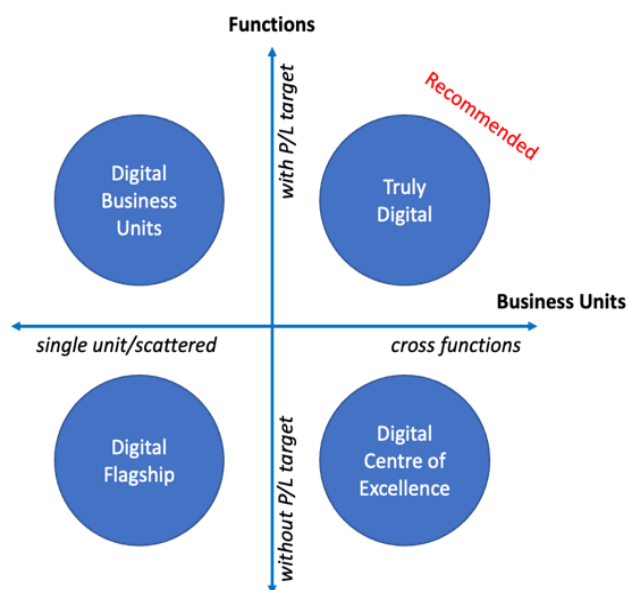


Fig 1. Digital transformation categories adapted from KPMG (2020)



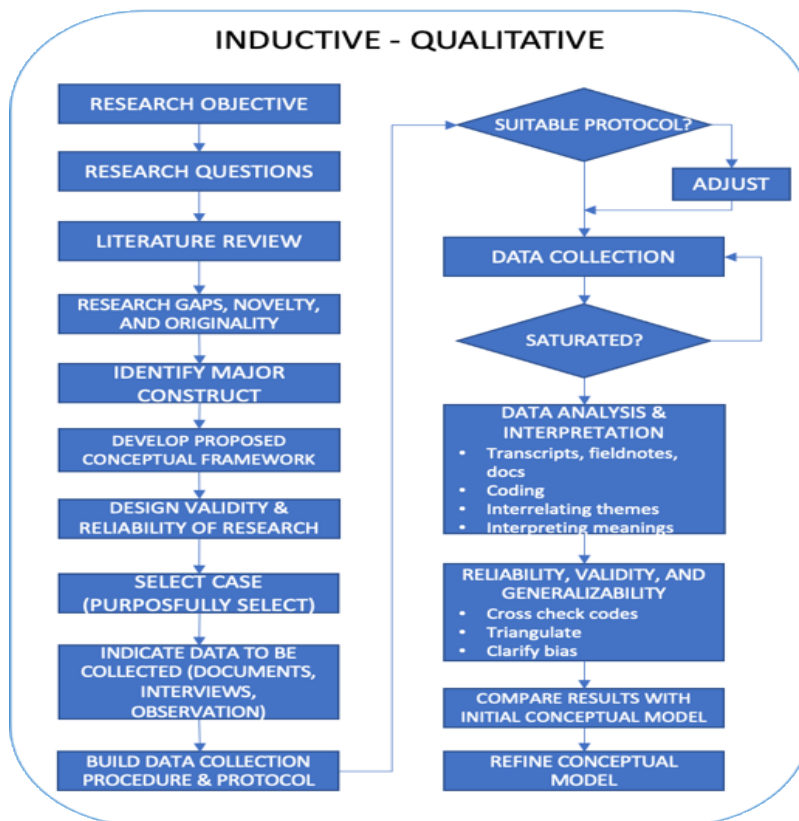


Fig 2. The qualitative research flow

The purpose of interviews is to get insights regarding what makes each human, process, and technology competency and how to build and implement them in banking organizations.

Interview questions evolve and become more specific in the subsequent interviews as the authors reach a better understanding of the substantial issues related to the topic. Document reviews, records analysis, and focus group discussion may be conducted as well to enrich the qualitative data or for triangulation purposes. The nature of the exploratory study is unstructured, relies on the quality of informants, and requires the interviewer to understand the context.

Referring to Creswell (2018), qualitative analysis starts with data preparation, in this case transcribing interviews, typing field notes, organizing data into specific types. Then continues with coding, which is a process of segmenting sentences or material into categories, labeling each category with a term. The next process is to generate a description of the setting or

categories for further analysis, these categories will form major findings of this qualitative study. For this research, the authors employ NVivo qualitative data analysis software that greatly helps to organize, analyzing, shaping, and modeling the unstructured qualitative data. The final step in data analysis is making interpretations, asking the lesson learned taken from the data analysis. Upon the completion of these steps, a refined corporate competency model is obtained as an outcome of this study.

## **Results**

Due to the Covid 19 pandemic limitations, most of the interviews were conducted virtually through Zoom video conferencing. The thoughts on the understanding of digital competency at a corporate level and the list of essential digital competencies required to support digital innovation or transformation from people, process, and technological lenses. Given the different states of digitalization being implemented in those four banks, it is also interesting to observe whether or not this factor would affect the perception of the required digital competencies to support the bank's digital innovation. List of respondents is shown Due to the Covid 19 pandemic limitations, most of the interviews were conducted virtually through Zoom video conferencing. The thoughts on the understanding of digital competency at a corporate level and the list of essential digital competencies required to support digital innovation or transformation from people, process, and technological lenses. Given the different states of digitalization being implemented in those four banks, it is also interesting to observe whether or not this factor would affect the perception of the required digital competencies to support the bank's digital innovation. List of respondents is shown in Tab 1. The focus of the semi-structured in-depth interviews is to probe informants' thoughts on the understanding of digital competency at a corporate level and the list of essential digital competencies required to support digital innovation or transformation from people, process, and technological lenses. Given the different states of digitalization being implemented in those four banks, it is also interesting to observe whether or not this factor would affect the perception of the required digital competencies to support the bank's digital innovation.

Informants were asked what the key competencies their banks have been planning and executing are and what else needs to be developed if any. To help structure the discussion, probing was conducted on each of the human, process, and technology aspects that comprise corporate digital competencies.

Tab 1. List of Respondents

No	Organization (State of Digitalization)	Role in Organization	Data Collection Type	Meeting Type	Duration
1	Bank A (Digital Flagship)	EVP, Head of Information Technology	Semi-Structured In-Depth Interview	Face to Face	21 mins
2	Bank A (Digital Flagship)	SVP, Head of Digital Product	Semi-Structured In-Depth Interview	Face to Face	41 mins
3	Bank A (Digital Flagship)	SEVP, Head of Human Resources	Semi-Structured In-Depth Interview	Face to Face	46 mins
4	Bank A (Digital Flagship)	SEVP, Head of Retail Banking	Semi-Structured In-Depth Interview	Face to Face	25 mins
5	Bank B (Digital Centre of Excellence)	SVP, Group Head of Digital Banking Delivery	Semi-Structured In-Depth Interview	Online and Recorded	47 mins
6	Bank B (Digital Centre of Excellence)	SVP, Group Head of Corporate University	Semi-Structured In-Depth Interview	Online and Recorded	52 mins
7	Bank C (Digital Business Unit)	Chief Strategy, Transformation, and Digital	Semi-Structured In-Depth Interview	Online and Recorded	35 mins
8	Bank C (Digital Business Unit)	Director of Information Technology	Semi-Structured In-Depth Interview	Online and Recorded	42 mins
9	Bank C (Digital Business Unit)	VP, Digital Liabilities and Payment Head	Semi-Structured In-Depth Interview	Online and Recorded	72 mins
10	Bank C (Digital Business Unit)	Director of Human Resources	Semi-Structured In-Depth Interview	Online and Recorded	43 mins
11	Bank D (Truly Digital)	Group Head of Technology	Semi-Structured In-Depth Interview	Online and Recorded	41 mins
12	Bank D (Truly Digital)	Group Head of Human Capital	Semi-Structured In-Depth Interview	Online and Recorded	36 mins

Voice-recorded interviews along with field notes taken during the interview sessions are collated for further analysis processes, namely transcribing, coding, and interpreting. NVivo software is employed to assist throughout data sorting, coding, and preparing diagram processes. This software improves the flexibility, accuracy, and comprehensiveness of the overall process. The most frequently appeared words from the interviews can be observed in the word-cloud Fig 3. Coding and analysis results can be observed in Tab 2. Key findings and insights are as follow.



Tab 2. Corporate Digital Competencies for Digital Banking Innovation: Case Studies in Indonesian Banking Sector

Competency Domain	Competency Name	Definition	Mentioned By	
			Informant	Rep
Human Competency	<i>Human Centered Design (UI/UX)</i>	Techniques or methods applied in product developments, whether to digital or phisycal produts. The focus here is to optimise usability or experience of human as the ultimate users of the products. For example: <i>ergonomics, human factors</i> .	9	27
	<i>Design Thinking</i>	Ability to provide a solution-based approach to solving problems. It emphasizes the need of understanding end-to-end customers' needs, identifies solutions, measurement, implementation, and monitoring cycles.	9	26
	<i>Digital Communication</i>	Human communication in the digital environments. This includes sharing resources through online media, collaboration through online tools, interaction with cross-cultural communities.	10	20
	<i>Cognitive Analysis &amp; Problem Solving</i>	Ability to identify digital needs and resources, often related with numbers and unstructured data. Then solve conceptual and technical problems with digital means.	8	15
	<i>Digital Security &amp; Safety</i>	Understanding the inherent risks of digital solution of digital banking solutions. Digital security and safety must be embedded into any digital banking products/services.	7	11
Process Competency	<i>Learning &amp; LO</i>	Capability living and learning organizational that intelligently facilitates the performance and learning its entire members, continuously transforming itself [12].	12	57
	<i>Agile Product Development</i>	A process that allows a shorter time to produce and launch products to market, get customer feedback, evaluate, then refine. Digitalization and interconnection of systems, products, processes, and value-chains trigger the value creations and business models.	10	30
	<i>Business Process Management (BPM)</i>	Understanding, documenting, and continuous improvement of the day-to-day business process are key to supporting digital banking innovations. There is a stronger link between the implementation of BPM and digital innovation [25].	8	25
Technology Competency	<i>Artificial Intelligence &amp; Automation</i>	Hygiene factors to allow quick and better decision-making. They are used to improve internal processes in banking organizations as well as to serve customers better.	8	22
	<i>Big Data Analytics</i>	Technical ability to collect and process information from different sources and formats, including processing the unstructured information to turn them into valuable insights.	9	20
	<i>Cyber Security</i>	Ability to secure and protect customers' as well as companies' assets from any potential cyber-attacks and malware. Often require implementation of robust cyber security capability across their infrastructure, front-end, and back-end systems.	5	13
	<i>Open API</i>	Technology capability that allows a bank to connect to a third-party host easily and securely. Open-API provides a more competitive advantage to companies to connect and collaborate with the digital ecosystems.	4	12
	<i>Cloud Computing</i>	Computing model that offers quicker infrastructure provisioning, flexibility, cost-efficient, reduced risk of a security breach, and elasticity to growth which are essential to digital banking innovation.	6	10
	<i>Micro-services</i>	Technology used to decompose a complex technology component into smaller and autonomous parts. It allows companies to gain benefit from modern architecture and create a protected scalable environment to deploy new capabilities quickly.	4	10

### Human Competencies

All of the informants agree that human competencies are key to the success of digital innovation in banking sector. A respondent states that “*from the human aspects, it is necessary for people to have core fundamental knowledge of digital in every layer of the organization. If I may share, we have defined 6 future ready skills, some of them may not specific only to banking industry and it is very interesting. They are agile, human centered design, digital cyber security, problem solving, design thinking, and digital communication*”.

*Human Centered Design (UI/UX)*. The informants described this as a personal competency to understand what customers want in the innovation of products and services as solutions to digital banking, then ensuring that products and services are designed, developed, and tested

to meet the customer's "humans" needs. This aspect is not entirely included in the DIGCOMP framework. However, some past literature has highlighted this competency is key to any product development, particularly in the digital world (Unger & Canciglieri, 2018), (Nguyen et al., 2022).

*Design Thinking.* Generally defined as ability to provide a solution-based approach to solving problems. It emphasizes the need of understanding end-to-end customers' needs, identifies solutions, measurement, implementation, and monitoring cycles. This competency includes problem identification, creative use of technology, and solving technical problems. This is mentioned in the DIGCOMP framework as "problem-solving" competence.

*Digital Communication.* Effective and efficient communication competency is essential to navigating the constantly changing digital business environment. Discussions and town hall meetings are important to generate ideas, develop a digital mindset, and improve staff engagement in the company's digital agendas. This is aligned with the same competence area in the DIGCOMP framework.

*Cognitive Analysis & Problem Solving.* Analytical thinking, critical thinking, problem-solving, and decision-making are included in this theme. It is the ability to understand things, draw conclusions, and use it to solve business problems. Informants also mentioned resiliency and perseverance are accounted for as the required soft skills to support this theme.

*Digital Security & Safety.* Understanding the inherent risks of digital solution of digital banking solutions. Digital security and safety must be embedded into any digital banking products/services. The following aspects are included in this category: protecting customer data, protecting devices, protecting the company's assets, and protecting the environment as also mentioned in the DIGCOMP framework.

### **Process Competencies**

From the interviews, informants highlight the importance of adopting the right processes to optimize digital innovation journey. "Organization learning through various channels and methods,

*adopting the right business process, and agility are among the most crucial processes to have in the digital transformation”*, mentioned statement from one of the interviews.

*Learning & Learning Organization (LO)*. The informants suggested that learning capability is essential to anticipate a fast change of business environment that may disrupt companies. All the case study banks have already implemented learning programs, although the model and intensity are different from one case study to the others. The importance of becoming an LO is also mentioned several times in the interviews. Aligned with LO characteristics in the digital era (LO 4.0) as prescribed by Daly & Overton (2015), informants highlighted the learning participation from all employees across different functions and levels. The wide use of digital technologies such as IA to help analyzes and propose employees' learning program, learning management system (LMS) that allows mobile and any-time learning by the banks' employees.

*Agile Product Development*. A process that allows a shorter time to produce and launch products to market, get customer feedback, evaluate, then refine. Agile process is key in developing digital products/services given the fast-changing of customers' needs and expectations. Some informants, however, suggested that agile methodology may not be suitable to be applied to “legacy” systems such as core banking and cards systems. Digitalization and interconnection of systems, products, processes, and value-chains trigger the value creations and business models as mentioned by Camarinha-Matos et al. (2019) above are also confirmed by the informants.

*Business Process Management (BPM)*. The informants suggested that understanding, documenting, and continuous improvement of the day-to-day business process are key to supporting digital banking innovations. It shall begin with understanding the customer journey to define an optimal process to meet the customer's needs. Tahir & Van Looy (2020) describe a stronger link between the implementation of BPM and digital innovation. BPM is expected to create value out of employees and customers through balancing explorative and exploitative business processes to achieve the organization's imperatives.



### **Technology Competencies**

The last aspect of digital competencies discussed with the informants is technology. All of them agree that focusing on implementation of the right technologies is essential for digital innovation. One of the respondents suggests the following “*I think the most important things support flexibility and agility in the digital innovation are cloud adoption, then micro-services and open API implementation. Implementing cutting edge technologies such as biometric and AI is also vital*”.

*Artificial Intelligence (IA) & Automation.* IA and automation are considered as hygiene factors to allow quick and better decision-making. They are used to improve internal processes in banking organizations as well as to serve customers better. This is aligned with a previous study from Marr (2019) which describes that 52% of banking and financial services executives confirmed that they are making a substantial investment in IA while 72% believe AI implementation will deliver benefits to their business.

*Big Data Analytics.* As information becomes a new currency in the digital world, bank organizations need to be able to collect and process information from different sources and formats, including processing the unstructured information to turn them into valuable insights. A previous study from Nobanee et al. (2021) reveal that Big Data Analytics has positive contributions to the competitiveness of the banking business model, improving customer experience, managing internal and external fraudulence risk, and maximizing profit.

*Cyber Security.* The informants emphasized that the bank’s products and services must be safe to use. Hence, it is crucial for banks to implement robust cyber security capability across their infrastructure, front-end, and back-end systems. Cyber security must be able to protect customers’ as well as banks’ assets from any potential cyber-attacks and malware. In line with this, many previous studies suggest the importance of having a robust cyber security measure for banking and financial service providers. Acharya & Joshi (2020) state that cyber security preparedness is the most basic objective of banking institutions, therefore banks need to establish a regular review on the cyber security landscape and emerging threats.

*Open API.* Another technology capability that allows a bank to connect to a third-party host easily and securely is through an Open-API. The more flexible the Open-API will provide a



more competitive advantage to the bank to connect and collaborate with the digital ecosystems. This element of technology capability is highlighted multiple times by the informants as banks are expected to connect to other institutions to gain as many as possible value-added products and services to offer to their existing customers or to attract new customers to onboard.

*Cloud Computing.* Cloud computing offers quicker infrastructure provisioning, flexibility, cost-efficient, reduced risk of a security breach, and elasticity to growth which are essential to digital banking innovation. Marr (2019) included cloud computing as part of the 7 biggest technology trends to disrupt banking & financial services in 2020.

*Micro-services.* The idea of micro-services is to decompose a complex technology component into smaller and autonomous parts. This is essential to support agility and to build more sophisticated and large-scale banking applications. It allows the development team to carry out multiple developments and testing activities simultaneously without great efforts of integration. Oracle (2021) argues that micro-services allow banks to realize the benefits of modern architecture and create a protected scalable environment to deploy new capabilities quickly, bringing continuous innovation to the marketplace.

In addition to the above competencies, several informants also highlighted the importance of the leadership aspect in the banking organization. They believe leaders' involvement in developing these competencies is paramount important. Beyond inspiring and motivating employees to embrace the corporate digital business transformation, leaders need to be clear on the pathway in putting in place the right human, process, and technology competencies to support the digital vision and strategy.

## **Discussion**

This qualitative study focuses on the investigation of the required corporate digital competencies that the banking executives need to develop to support digital banking innovation. From the above findings, authors consistently observe informants mentioning the need for comprehensive focus across the people, process, and technology aspects.

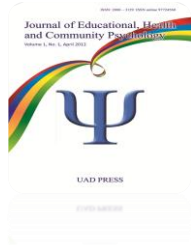
The authors also observe that there is no significant difference in term of type of competencies deemed necessary from one banking organizations in the case study to the others. This means that irrespective to their current state of digitalization, the perceived required competencies across human, process, and technology aspects are consistent between the case study bank organizations.

Human centered design, design thinking, communication, cognitive analysis & problem solving, and digital security & safety are among the most mentioned human competencies by the expert informants. Except for design thinking that can be thought to have been covered in the other competencies such as problem solving and human centered design, the remaining human-related competencies come out from this study are consistent with the previous study from Ferrari's DIGCOMP framework (2013) as outlined earlier.

On process competencies, informants emphasize the need for learning & learning organization in the sense that organization has to encourage and facilitate learnings to support digital innovation culture, this is aligned with Senge's LO concept and that LO practices can only be effective with the support from digital technologies such as e-learning and learning needs analytics tool, this confirms LO 4.0 theory from Daly & Overton (2015).

Agile as an iterative and continuous processes from planning, development, implementation, and evaluation as mentioned in Camarinha-Matos et al.'(2019) study is also consistently mentioned by the informants. The last competency mentioned in this category is Business Process Management (BPM) that is essential to support the iteration of digital innovation process.

While on the technological aspect, some emerging technologies are suggested, namely artificial intelligence & automation to improve internal process and efficiency, big data analytics that is vital to improve competitiveness and customer experience which is also aligned with previous study from Nobanee et al. (2021), cyber security to secure the bank and customer's assets and information, open API, cloud computing, and micro-services to break down a large and complex component into smaller autonomous components to accelerate product time to market as also suggested by Oracle (2021).



## **Conclusion**

Embarking into digital transformation through innovation is a strategic decision to be considered and decided by banking executives. Not only will it require major investments, but it will also need strong commitments from the stakeholders. Rethinking customers' needs and experience should be at the heart of it. Digital transformation may mean revisiting business strategy, operating model, IT transformation, transforming banking products and services to be accessible digitally, to changing corporate culture. Digital transformation is often a one-way direction, in the sense that once it is started and customers are used to its results, it is no way of reverting to the old business and operating models. Therefore, it is paramount important for banking executives to ensure their preparedness prior to kicking off their digital transformation agenda.

Another valuable insight that came out from the expert interviews is that corporate learning has become a prominent skill that must be acquired by banking organizations. The need has been shifted from being great at doing particular things to becoming good at learning new things. This will remain the interest of the next phase of this study, particularly on investigating learning interaction model involving the learning actors in the digital era: humans and machines.

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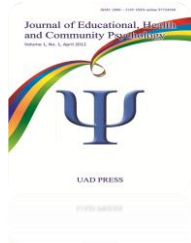
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