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Digital Startups Fundamental Capabilities in New Product Development: Multiple Case Studies in Bandung, Indonesia

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Abstract

Digital startups compete by increasing their ability to innovate in new product development. New product development becomes one of the main processes for startups to scale their product quality. As there are many frameworks of new product development to follow, the particular new product development in digital startups should be established to contribute to the theory. Therefore, the research question of this study is: What are the fundamental capabilities of new product development in digital startups. This research uses the exploratory study approached by qualitative research, interviewing at least CEOs of four digital startups in Indonesia and a technology-based new ventures expert. From the study, there are three influential capabilities in the new product development in digital startups, such as financial, market, and technology. The connection between capabilities contributes to the theoretical framework. The implication of this study is to help practitioners to conduct an ideal new product development process.

Keywords—Digital Startups ; Financial Capability; Market Capability; New Product Development; Technology Capability.

Abstrak

Startup berbasis digital berkompetisi dengan cara meningkatkan kemampuan mereka untuk berinovasi pada pengembangan produk baru. Pengembangan produk baru menjadi salah satu proses utama untuk meningkatkan kualitas produk yang dihasilkan startup. Secara umum, banyak sekali kerangka pengembangan produk, namun belum ada yang dibuat khusus di ranah startup digital. Hal ini dibutuhkan untuk kontribusi dalam teori. Oleh karena itu, pertanyaan dari riset ini adalah apa saja kemampuan dasar yang dibutuhkan startup digital untuk pelaksanaan pengembangan produk baru. Penelitian ini menggunakan studi eksplorasi dengan pendekatan kualitatif, mewawancarai setidaknya CEO dari empat digital startup di Indonesia, dan seorang ahli di bidang pembuatan perusahaan bidang teknologi. Dari studi ini, ditemukan tiga kapabilitas penting dalam pengembangan produk di startup digital, yaitu finansial, market dan teknologi. Hubungan antar kapabilitas berkontribusi pada kerangka kerja teori. Implikasi dari studi ini dapat membantu praktisi dalam mengadakan proses pengembangan produk baru yang ideal.

Kata kunci— Kapabilitas Keuangan; Kapabilitas Pasar; Kapabilitas Teknologi; Pengembangan Produk Baru; Startup Digital.

I. INTRODUCTION

As technology advances rapidly in this era, many industries have continuously implemented updated technology. There has also been a significant increase in the development of technology-based ventures as it is easier to obtain investment to build a small company. Therefore, the trend of technology-based ventures has exploded for the past ten years (Crunchbase, 2020). It affects the intensity of competition, which requires startups to innovate in many ways.

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Several types of innovation can be applied in digital startups, such as product and process innovation (Tidd & Bessant, 2018). Both are used in new product development as it is the core process in digital startups. New product development converts ideas into successful products or services with benefits for the target market. Furthermore, since digital startups are required to move and adapt quickly to compete, the significance of conducting new product development using the most effective and efficient process is exceptionally high.

Several factors are needed to conduct the ideal process of new product development (Cooper, 2019). One of them is technology (Kang et al., 2012) and market knowledge (Montanari & Bergh, 2019; Zhan et al., 2019). There are also frameworks of new product development needed to conduct the ideal process and require some attributes (Brown, 2008; Cooper, 2008; Ries, 2011). However, due to limited studies explaining new product development, particularly in digital startups, a remaining research question needs to be answered: What are the fundamental capabilities of new product development in digital startups?

This study contributes to the new product development in digital startups' body of knowledge since previous studies conducted in digital startups are limited. We believe the results of this study will help the digital startup players and practitioners to perform their new product development process in ideal ways. Furthermore, this study can be the stepping-stone for other researchers to do further research in the required capabilities of digital startups' new product development.

The introduction begins with the structure of this paper, followed by a literature review that will explain the theory that supports this paper. The research design, findings, and discussion will then follow to give further understanding of the result. The implication, limitation, and future research agenda will be lastly presented.

II. LITERATURE REVIEW

A. *New product development in digital startups*

Digital startups have unique characteristics compared to other types of firms. Before they reach maturity, Crowne (2002) stated that they have to pass three stages: startup or early stage, stabilization, and growth. The early stage is when they build a product before obtaining the first sales. Meanwhile, the stabilization stage is between acquiring first sales and a stable product, including steady product development. Lastly, the growth stage is when the replication of products occurs without creating barriers to product development. After the market size and share are firmly established, the companies become mature.

While mature firms have the standard process and procedure, startups are still experimenting with their internal entities (Ghezzi, 2019). It is possible due to their conditions being in the early stage of the business life cycle with small teams and limited resources (Sutton, 2000). It also creates high flexibility in startups, which is the consequence of trends and external environment rapid changes (Abouzeedan et al., 2013; Corral de Zubielqui & Jones, 2020; Tam et al., 2020). Furthermore, the differences between startups and established firms require different approaches to new product development.

There are several new product developments (NPD) approaches applied in technology ventures which implement different principles. The most recent one that has been adopted in existing digital startups is Lean Startup (Ries, 2011), which also renews and adds the previous studies, such as Stage-Gate (Cooper, 2008) and Customer Development (Blank, 2007).

Ries (2011) introduced three crucial points to build a fast-growing startup: lean canvas as business model strategy, customer involvement to develop products, and agile methodology, which hold into agile manifesto and principle (Manifesto for Agile Software Development, 2001). The famous slogan is "build fast, fail fast," which suggests the startups create products with minimum viable requirements and soon enter the market to be tested by customers. They quickly get feedback to improve their product and iterate the whole process of new product development. However, there are no further explanations on NPD elements or components by lean methodology or other startups NPD approach. Therefore, the fundamental capabilities must support more efficient and effective NPD processes leading to product success.

B. *Capabilities requirement to conduct new product development*

In several cases, NPD is often included as a research and development process that covers the process, starting from discovering the ideas to developing the products. It is universally understood that NPD is an essential process in the company. Many previous studies had been conducted to uncover the relationship of new product

development to other constructs (Athaide et al., 2003) or offer new product development models (Drejer, 2000; Trott & Hoecht, 2007).

Some prior studies confirm the importance of having technology capability as factors that influence product development (Kang et al., 2012). Financing also plays a crucial role in building the product (Hellmann & Puri, 2000). There is a relationship between factors in technology products (Iamratanakul et al., 2014) and the success drivers in NPD processes (Cooper, 2019). The factors relating to the product development are resources (Köhler, 2013), stakeholders (Melander et al., 2014), customers as general (Chang et al., 2019; Wang et al., 2019), and the customer as particular in participation (Morgan et al., 2019b) and in knowledge (Montanari & Bergh, 2019; Zhan et al., 2019). Those prior studies offer an understanding of foundational abilities to support digital startups' new product development: financial, market, and technology capabilities, as seen in Figure.1.

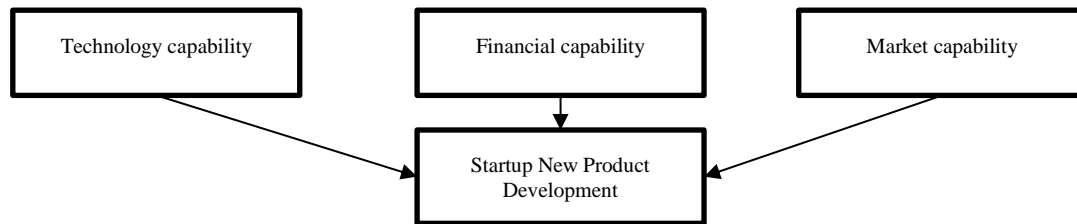


Figure. 1. Theoretical framework

1) Financial Capability

Taylor (2011) defines financial capability as the ability possessed to handle internal finances. In firms, this capability is powerfully relatable with firms' strategies in high levels of management (Furrer et al., 2008). Although most previous studies agree that a firm's strategies depend on financial capability, many argue the existence period of the financial ability over the firms' strategies (Bagire & Namada, 2013). Either way, to increase productivity, firms need financial and management resources as two equals simultaneously (Hoopes et al., 2003).

Digital startups possess limited resources in the beginning stages of their lives, including financial support. However, in innovation creation and developing a new product, they require financial capital to explore those opportunities. Giudici and Paleari (2000) suggest startups to acquire some external financial resources to overcome those barriers. There are several options to gain financial capital, such as access to debt and equity to banks as formal institutions or investments from crowdfunding, angel investors, and venture capital (Hellmann & Puri, 2000). After obtaining external funding, they can manage according to their prioritization, usually acquiring physical assets like facilities, employees with a particular set of skills, and mass production of appointing products (Giudici & Paleari, 2000).

How they gain financial access depends on the long-term goal they have. Although it is commonly acknowledged for startups to pursue fast-growth, as stated as one of the startups' characteristics (Blank, 2007; Ries, 2011), some startups choose to have slow-growth business as their goals. It means a stable increase with little ups and downs performance in the process. Those startups refuse to get external funding from investors and decide to have a side hustle as a steady income as they work on their main product. As expected, they are less likely to be the winner of the competition in a short time. However, it is a viable and exciting approach as they aim for survival.

2) Market Capability

The market capability of digital startups is the ability to find opportunities in the market to be able to innovate (Roberts & Grover, 2012a, 2012b). Market commonly shows the dynamic business environment related to what customers need and want, which should be responded quickly to stay competitive (Hajli et al., 2020). The purpose of market capability is customer satisfaction (Roy et al., 2017) which could be achieved by focusing on customer, profit and marketing coordination (Kohli & Jaworski, 1990) finding the best way to solve customers' problems and needs (Gligor et al., 2019).

NPD in digital startups should solve real-world problems (Blank, 2013). It encourages companies to develop the right products based on the understanding of the market. Furthermore, since the rapid change in the market influences product performance, the companies must adapt to the market situation (Chang et al., 2019; Morgan et al., 2019a; Wang et al., 2019). Therefore, they can offer the right product for the right time and market. It represents the high market capability in digital startups related to new product development.

3) *Technology Capability*

Utilizing technologies to produce a better innovative product or process is the fundamental definition of technology capability (Halac, 2015). By applying existing technology, enhancing the productivity of the firms and creating more effective and efficient processes. It could be upgraded with the newest technology since the awareness of technology development will be early detected. Then, firms will start to assess the trends compared with their current functions to decide whether to imitate or adopt those technologies to increase their abilities to compete with others (Halac, 2015).

Digital startups require technologies as fundamental components of their business. It is significant to understand technology as their central perspective to maintain and improve their innate abilities. It is mentioned particularly by “various technological activities” and “combination of several particular technology resources” (Halac, 2015; Panda & Ramanathan, 1996; Voudouris et al., 2012). Besides, potential technology should be predicted to survive in the competition (Song et al., 2008). Therefore, technology capability possesses obscure interconnected abilities rooted in firms’ culture and should be presented as strategies’ element (Day, 1994; Halac, 2015; Zhou et al., 2018).

III. RESEARCH METHODOLOGY

Understanding new product development in digital startups requires close observation and direct conversation with critical persons of companies. Besides, since this is an exploratory study, it needs a qualitative approach to gather data from the field. Therefore, the case study methodology is taken to get a closer look at digital startups by considering the context taken in each firm (Yin, 2018).

A. *Data collection*

Indonesia is the fifth rank globally based on the number of digital startups (Startupranking, 2020). Based on that fact, we believe that case selection in digital startups is appropriate. Moreover, product development is implemented in a complex process internally involving many parties in the companies, from business idea to commercialization, making it necessary to have in-depth interviews with employees related to the topic, particularly people with high-level positions.

Four digital startups in Bandung are selected to represent the data, which in this study are called using pseudonyms: A, B, C, and D companies. We chose those companies since they are rising companies in specific places that are well-known as an innovative city, applying artificial intelligence as the core technology of their products, which adds the complexion in the product development process. We choose 11 persons to be interviewed with these profiles in detail: four CEOs and six employees on crucial positions related to product development from selected studied cases, and one expert of digital startups consultant as the triangulation. Since product development covers the whole process of idea creation to product-market and product improvement, at least two top-level management people are interviewed to enrich data and impose different perspectives. We conducted four interviews in A company with various interviewees. The product development of the company has become advanced, and they have also experienced more complex pivoting, more product creation, and older ages comparing other companies.

Semi-structured interviews are chosen to be the method of data collection. The list of the questions was (1) Business idea to product creation (2) Product journey and pivoting (3) Product design, development, and deployment. The data were collected from November 2019 to March 2020. All interviews use the Indonesian language, the mother tongue of all interviewees, and interviewers involved, thus easily fully understood. It is also tape-recorded based on the interviewees’ permission and follows the ethical guideline (Newing, 2010). The total time of interview hours is 12 hours 12 minutes 47 seconds, which shows an average time of 1 hour 6 minutes 37 seconds for each interview. Secondary data is also collected from the startups’ official websites and social media to enrich the information.

Table 1. Study Units and Interviewees Detail

Description	Business Domain	Product Type	Age (years)	Employees number	Interviewee ID	Interviewee Role	Startup Experience (years)
					A1	Founder/CEO	9
					A2	Business Development Strategist	7
					A3	Head of Product	7
					A4	Head of Engineering	7
			3	50-100	B1	Founder/CEO	7
					B2	Head of Business Development	3
					C1	CEO	2
					C2	Founder/CTO	3
			2		D1	Founder/CEO	5
					D2	Founder/CTO	2
Startup expert	-	-	-	-	SE	Startup expert	30

B. Data analysis

The process of data analysis was started by transcribing the recorded data, from audio to text. This method is followed by categorization through coding. Then, analytical coding was conducted by pattern matching with the literature review to gain more comprehensive knowledge of answering the research question (Saldaña, 2013).

During the interview, the first author took notes on essential objects or events related to the topic. It is useful as the lead of thematic analysis when analyzing the data, reading the transcript and relevant documents and using analytical coding. The conceptual understanding is developed by comparing empirical evidence of business ideas to product creation, product journey and pivoting, and product design, development, and deployment (Yin, 2018).

C. Validity and reliability

From the case study, the researcher could obtain information about particular processes of particular outcomes (George & Bennett, 2005). The procedures of gaining that information by conducting multiple interviews from different actors in the same firm ensure internal validity. External validity is also achieved by interviewing various firms in the same industry to confirm generalization. Information from a technology-based new ventures' expert is also confirming the validity of the research. Triangulation was done by different sources from different sources, followed by the pattern-matching technique of empirical evidence and existing theories (Yin, 2018). Triangulation is also done using the expert interview and compare it with evidence on field interviews.

The transparency of interview data collection, process, and analysis provides reliability for this research. By sharing the interviewees' data presented in Table 1, other future researchers could learn and establish better research methods and procedures to be utilized in their further research from this study (George & Bennett, 2005).

IV. RESULT AND DISCUSSION

We present the product performance and company's profile data by summarizing the interview data that might add more information to analyze the new product development based on Table 1.

A. Financial Capability

Company (A) aims for a significant number of customers since they adopted the Lean Startups principle and want to develop the right product quickly. Based on that situation, they soon passed the early stage and entered the growth stage. The selling business models were hard to be implemented on their last mile customer; then they quickly changed to renting business model. A company's main product involves complex relationships between

hardware and software technologies. Thus, they need a significant number of financial resources to do mass production of their product to enable the new business model.

"In 2017, we pivoted our business model from selling to renting. That time, we get seed funding investment so we can conduct mass production for our automation product. Therefore, our sales have increased by 100% from 60 to 200." A1, 2019.

Company (B) believes that they can reach financial sustainability by doing daily projects while also building the products. Although finance is essential, they do not want to rush things by having an investment. By earning money regularly from side hustling, they can afford salaries and provide facilities in a much stable way.

"We are focusing on our financial sustainability by getting project-by-project to be conducted. I think it is a crucial thing to have by digital startups. Without financial resources, we could not grow, even if we could not do the daily business." B1, 2019.

Company (C) has realized that they need the financial capability to support their expansion of the product and the business. They think that their product is unaffordable for their customers using selling business models, and the solution is to change their business model to rent. To be able to do that, they need investment to produce a mass amount of their product.

"Our target for 2020 is to get an investment. Since our product is based on the Internet of Things and expensive compared to the financial ability of our customers, we plan to produce the product in a certain amount to make it available to be used by many more people. And it is only possible by getting investment." C2, 2019.

After realizing that their first product was unsuccessful due to its niche market and understatement value of technology, Company (D) proceeded to get investment to develop products as end-solutions to the customers. The investment fund is useful for gaining access to the data and obtaining qualified human resources, which fasten their speed of developing the products.

"We need investment to expand our business. Due to our target to build our product at a faster speed, we need money to access the data and human resources." D1, 2019.

Conclusions from the results of interviews regarding financial capability are : the financial capability enables the company to unlock other resources and make it easier to pivot or create another business model to gain more revenue.

"Surely, the most important thing that influences digital startups' business is the financial resource. Because it then leads to avail other resources, such as human resources, facilities, and many more." SE, 2020.

Based on the data presented in Table 2, the level of financial resources needs is influenced by the goals of the company. If the company wants to proliferate, they certainly need external funding. The uniqueness of the product also affects the difficulties in gaining external funding. On the other hand, if the company wants to take things slowly, enjoy the moment, aim for a slow-growth situation, they like to do projects to obtain cash flow.

Moreover, financial capability also affects the new product development of the company. If the company possesses the high financial capability, NPD will be more comfortable and faster. Otherwise, NPD will be slower if the company has a limited budget.

Table 2. Financial Capability Comparison

Financial Component	Company (A)	Company (B)	Company (C)	Company (D)
Goals	Fast-growth	Slow-growth	Fast-growth	Fast-growth
Level of needs	Very high, because of the mass production of hardware product	Medium, due to the operational	Very high, because of the mass production of hardware product	High, due to the operational and building the product
Current financial source	Investors	Side projects	Small funding, planning to get investors	Investors and side projects

B. Market Capability

Company (A) put customers as their first value, which proved that they have understood that market value is vital to their business. Not only do they listen to their customer, but also they plan to implement their feedback as they believe customer feedback will improve their product quality. To keep and enforce their value, they create field teams responsible for serving the customers directly and building close relationships with each other. Therefore, they could gain information about their customers' pain points better and faster.

“I think what matters the most to our successful expansion is the aggressive target and execution and learning speed. Our ability to respond to demand as fast as we can is important to our success. We have ‘farmers first’ as our value, which means we prioritize our customers and ensure that our product satisfies their needs.” A1 2019.

“We create our business models regarding customer behavior. Our technology-based product at first was confusing for customers. Then, we improved our product based on their feedback. Currently, our products are implemented in many villages across provinces.” A1, 2019.

Due to the type of business model, Company (B) could get market knowledge without restraint. They provide service and customization based on customers' preferences, and at the same time, they learn what the customers need. The insight they obtain would be integrated into the improvement of the product.

“We do customization of our product based on what customers want. Then, we improved our main product to expand and solve general problems. By collecting customer needs, we believe we could establish good quality products.” B1, 2019.

Company (C) realizes they need customer feedback to improve their product quality. Due to their low sales, they could not get much feedback. Therefore, they choose an influencer of the industry as a partner to collaborate; the partner can use their product, and they can receive insightful suggestions to improve their product.

“We are still in the middle of our product development. Even though we have implemented several improvements to our products and released several versions, but we realize that we still lack the flexibility to maintain our product since our core product is hardware.” C2, 2019.

“It is advantageous for us to have a pilot product implemented for our partner. They can use our product based on a contract by paying cheaper for several months. In exchange, we can get their feedback by using our products. Then, we can use their educated feedback to improve our product quality.” C2, 2019.

Company (D) also reacted fast when the first unsuccessful primary product sales. They realized they should follow the market and change their products, even their business model. The result is currently satisfying. They offer their products to potential customers, gain feedback, and serve their existing customers with customization based on customers' needs, which enriches their product improvement data.

“At the beginning of our business journey, we only sell the fundamentals of our product technology. We thought it was a novel and special product. But then, we realize we can only reach customers in the niche market who did not fully understand our product value. Then, we developed a solution to solve customer problems as an end-product. From there, we can generate our revenue.” D1, 2019.

All case studies realize the importance of customer involvement in product development. They have different types of target markets and customers, as shown in Table 3. However, they can connect and relate to the customers' conditions, enabling them to understand their customers better. Using that situation, they acquire the ability to be flexible and adapt to new situations. Noticing the first business model and the current business model, they are slightly different. It is one of the evidence of being adaptable to unique market situations and beneficial to get higher profit.

“Even though the product has the best technology and the best quality, it does not satisfy customers, the business could not be worked, and the revenue could not be generated.” SE, 2020.

Table 3. Market Capability Comparison

Market Component	Company (A)	Company (B)	Company (C)	Company (D)
Target market	individuals	companies	individuals	companies
First business model	Selling the product	Ad-hoc projects based on contract	Selling the product	Selling product, subscription to the product
Market acquisition	Using internal field teams who have close relationships with customers	Clients or partners who have the desire to customize the products based on their needs	Partnership with influencers or role models of their field	Clients or partners who have a willingness to tailor the products based on their needs
Current business model	Renting the product for middle to low-class customers and selling the product for middle to high-class customers	Ad-hoc projects based on contract, and subscription to the product	Renting the product	Subscription to the product with an installation fee

C. Technology Capability

Using Internet-of-Things as its core technology, Company (A) combines several technologies' types to support their business, such as software, hardware, and data. These types of technology are difficult to integrate. Therefore, they learn faster and more profoundly about the existing and potential technologies to keep improving their product performance. They also need to ensure the quality of their hardware raw material supplies to serve the best quality. As they want to deliver better solutions by the most effective and efficient technology, they put minimum employees' technical ability standards. They also create product development teams who are the most knowledgeable persons of the product and technology and put them in every business unit to enhance product ability.

"Due to our fundamental technology in data, software, and hardware, we need certain technical skills to craft solutions for our customers." A4, 2020.

"We are a product-driven company that puts products as our core. Therefore, product development members are placed in every process of the firm to make sure it aligns." A3, 2020.

To compete with other firms, Company (B) keeps two things in mind: quality and price. They want to offer lower rates to the customers while also offering qualified products. Therefore, they need a particular technical ability to achieve their purpose.

"Product quality is important in our business. We offer 80 of 100 quality guarantees with 50-60 of price competition compared to our competitor. And it is not going to be a success if we do not have a product team with high technical skills." B2, 2020.

As their product complexity increases by having customer feedback close to their improvement, Company (C) understands that they need higher technical skills. However, since they do not have many resources, they stretch their time to do research using the current technology ability to reach a specific target even though it is slower than it should be.

"We need technical ability to support our product since customers give feedback to fix our product. For example, the first versions of our product were not robust and could not function in outdoor areas. Therefore, we have to fix it by beginning the research to accommodate this feedback using our technological skills." C2, 2019.

Technical ability is crucial to building Company (D) products related to artificial intelligence as their core technology. They know their strength and make the most of it by using their high technical ability to build unique products that differ in competition. They also bought their technology tools from trusted companies abroad to ensure their top product quality and performance.

"That is what differentiates our product from the competition: our fundamental technology. We are confident that we have people with deeper technology abilities in our field so that we can build an excellent product." D2, 2019.

To maintain or even innovate product quality, firms need precise technology capability to make it possible, as explained in Table 4. Most cases state that technical ability relies on human resources. Not only the technical

expertise, but also the core technology as in raw material, tools, and such, should be reliable to ensure product performance.

“The first influential factor of venture success is human resources. The qualified human resources. It means people with high technical ability to deliver products as what the firms want.” SE, 2020.

Table 4. Technology capability comparison

Tech Component	Company (A)	Company (B)	Company (C)	Company (D)
Internet-of-things or hardware presented as a product	Yes	No	Yes	No
Data as a platform required	Yes	Yes	Planning	Yes
Software product	Mobile application	Yes	Mobile application	Yes
Customization required	No	Yes	No	Yes

D. The link between financial, market and technology capabilities with new product development

The findings configure that there are connections between each capability relating to new product development. First, the link between technology and financial capabilities is shown by the fulfillment of technology tools and technical abilities on human resources using the financial income of the companies. This fulfillment leads to new product development conducted in the company.

“It is important for the company to have a stable income to acquire people with certain technical abilities.” B1, 2019

“We utilize several technologies from abroad which require high cost, but these technologies are mandatory for building our products.” D2, 2019

Second, financial and market capabilities relationships become apparent when the company wants to create close connections with the customers, particularly early adopters or loyal customers. It attempts to understand the market better. The company needs to secure some financial resources since it acquires financial support to enable those abilities. After gaining market knowledge, the company can create market-driven products with higher quality that can be sold better and earn higher revenue.

“Since our customers are in rural areas and have gaps in technology, we develop field teams to help and educate them. Fortunately, we get funds that enable us to do so.” A2, 2020

“If we want to test new features of the product easily, we have to create exchanges with influencers of the industry, which also allow us to promote our products.” C1, 2019

“Or we should have our places to do experiments, which require some money.” C2, 2019

In the studied cases, it is crucial to balance technology and market capabilities in new product development. Technology capability gives the knowledge on how the product quality will be. It aims to make the product in the right way. Meanwhile, market capability provides information on how the product should be. It aims to create the right product to release to the target customers. With the combination of those capabilities, the company can analyze its strengths and weaknesses in creating its planned development.

“It is possible for us to spread our products to other industries since we have comprehensive knowledge of the fundamental technologies.” D2, 2019

“We have supported data collected from many sources, including our existing products and our teams, which gave us information about what to do next. It gave us insights to create new business models.” A1, 2019.

E. Discussion

The findings configure that there are connections between each capability relating to new product development. First, the link between technology and financial capabilities is shown by the fulfillment of technology tools and technical abilities on human resources using the financial income of the companies. This fulfillment leads to new product development conducted in the company.

If the comparison of case studies' performance from the findings is conducted and sorted from low to high, C company is on the lowest level, followed by B, D, and A companies at the highest level. However, C and B companies' performance distance is too far, while B and D companies are only the slightest. A company rises to the top since it has acquired almost all of its environment's supply chain. Given the age of the companies, it is reasonable to see A company at the top. A company could be in the growth stage; meanwhile, the others are still in the stabilization stage. However, it uses different rationale when witnessing D company is higher than B company. At the same time, B is older than D. Moreover, C and B companies have far differences while they are the same age. According to that, firms' ages do not contribute to product success. Companies' success is influenced by new product development processes and the quality of the products (Tidd & Bessant, 2018). Thus, the main influential capabilities on NPD are uncovered, namely financial, market, and technology capabilities.

Financial capability is critical as the principal capital to gather other resources and invent new products or processes (Hoopes et al., 2003). It is determined by the goals of the firms and firms' type of technology product. There are two goals found in the results, which are fast-growth and slow-growth. If the firms choose to grow and they produce hardware products, they need money at the front to create in mass. Therefore, they need investors as funding sources. However, if the firms choose to build software products, they need to pay in periods as their resources are human. Investors can be the right choice if they want to achieve growth and fast performance. Hence, they can achieve performance stability without investors by acquiring and retaining new and potential customers and doing projects related to primary products.

Since digital startups want to survive despite their goals, they need to keep moving and adapting to new situations. They should also have the ability to read the market and satisfy them before anyone does (Gligor et al., 2019). It represents the necessity of market capability. All of the case studies possess market opportunities detection by building intimate relationships with customers. Some of them also try to acquire new customers and transcribe their needs as opportunities. As a result, the transformation of business models is unavoidable due to market adaptation.

Since digital startups are the main objects of this study, technology is the essential capability to conduct new product development. Without appropriate technology, the created product would not contain enough quality to enter the market. Moreover, to keep updating the digital product, they need technical skills that keep improving following potential technologies as it is an essential capital to compete in the market (Halac, 2015). Current technology trends that are obligated to be carried by them are data platforms and software products. Data becomes compulsory as advanced technology, the internet, and globalization enable it to widen the knowledge. Meanwhile, software products are familiar to the market as it is easier to be obtained and adopted by society.

Further analysis of the findings found that there are some connections between financial, market, and technology capabilities, as shown in Fig. 2. While financial resource inevitably affects how the company expands its market, both existing and potential markets, and acquire nascent technologies. The financial capability enables the company to adopt several market and technology options, which widen and deepen its capabilities in both areas. It also applies contrarily; when the company successfully expands market and technology capabilities, they obtain more revenue, representing higher financial capability.

Furthermore, market and technology capabilities also influence each other. There are two types of capability: existing and potential. If the company intends to acquire a potential market with different needs from the existing market, it has to use its potential technology capability. It goes similar to expanding existing markets; to serve other customers or additional needs, they need to dig more their technology capability since digital startups products are technology-based. However, potential technology capability is still required to develop a higher ability and quality of the product, a more effective and efficient process, even if they serve the existing market.

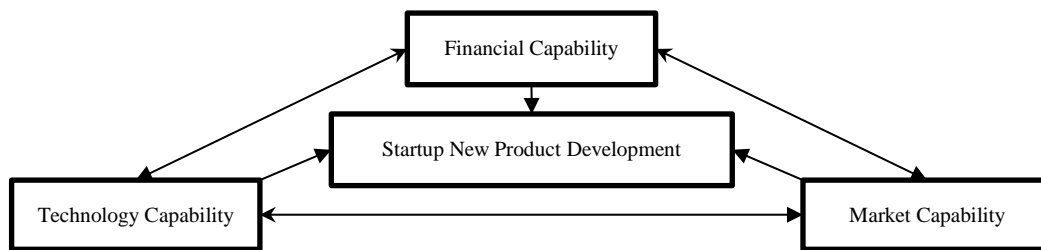


Figure 2. Proposed framework

V. CONCLUSION

We provide a new theoretical framework of new product development using the financial, market, and technology capabilities. Based on existing literature, the connection between new product development and the qualifications were explained independently, for instance, NPD-financial capability, NPD-market capability, and NPD-technology capability. However, in this study, a new relationship between those capabilities and NPD are found: NPD-financial-market-technology capabilities. Evidently, in addition to the existing literature of NPD and each capability connection, financial and market capabilities, financial and technology capabilities, and market and technology capabilities influence one another.

Those theoretical contributions also support practical implications for digital startups. Conducting new product development in digital startups is mandatory and challenging, as product innovation is well known to be developed in digital startups. Based on this study, digital startups obtain new knowledge on how they should establish their existing and potential capabilities to build a product. It is common to use agile methodologies on digital startups, which means the listed capabilities should be acquired in the whole process continuously in the companies. To create products, from ideas to commercialization, financial, market, and technology capabilities of the companies will determine the quality and performance of the products. Thus, it will decide whether the companies are able to survive in the competitive market or not.

However, this study has several limitations that could establish further research if it is managed to be covered. First, this study only uses case studies representing the newest technology, which is Artificial Intelligence. Future research should be able to pick several case studies that represent other industries or technologies that may be useful to create new insights. Second, the data only use four case studies with two representatives of each company. By acquiring more companies and more representatives, it should get more insightful findings to contribute to the theory. Third, the link between financial, market, and technology capabilities is presented briefly, and it should be proven by quantitative research to strengthen the generalization of the findings.

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