

INNOVATION MANAGEMENT FROM DYNAMIC CAPABILITY MANAGEMENT LENSE IN SCHOOL SETTINGS: A CONCEPTUAL FRAMEWORK

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Abstract

Implementation of innovation is the main indicator of success for innovation initiatives. The challenge on dynamic capability management, particularly for innovation, has been in place and studied by scholars. Yet, research regarding this matter from a strategic level and from school leaders' perspective is limited. Interviews conducted to school leaders in Indonesia showcase four resources to be managed for innovation in schools: human resources, technology, communication, and budget; each with their own antecedents. The focus to ensure success falls into human resources, namely willingness to adopt, understanding of the concept of teacher, comprehension level and learning speed. Meanwhile, from a technology standpoint, these antecedents include fulfillment of users' needs, integration with applied technologies, budget fitness and hardware requirements. Communication resources and their dynamics are text and visual based communication, meeting, and surveys. Meanwhile, the dynamics surrounding the budget are fitness with purpose and school's plan, return on investment, and external contribution. This study supports the creation of a new proposition on innovation dynamic capability management from the school's perspective. School leaders can use this research as a reference point to strategize future innovation projects.

Keywords: *Innovation Capability, Dynamic Capability, Innovation Capability Management, School Leaders*

1. INTRODUCTION

Innovation is imperative for organizations to survive and thrive in today's world. To ensure that innovation can be fruitful in various settings, then an understanding of determinants of innovation success must be in place. Research by Klein and Sorra (1996), provides the answer that the outcome of innovation initiatives is determined by climate for innovation and innovation-values fit in an organization. As a result of both factors, leaders in an organization would see outcomes from resistance, avoidance, compliance, and commitment to implement innovation. From the climate perspective, the likelihood of innovation success can be derived from leaders' ability to apply incentives and disincentives as well as eliminating obstacles to create better. As for innovation-value fit, leaders can achieve it by having a commitment to implementing innovation.

The authors argue that for leaders to achieve the ideal situation for innovation success, then the ability to manage resources required for innovation would be crucial. Both organizational climate and innovation values fit; regardless of the relevancy in the organization; would not create the intended impact if resources are not managed accordingly. This logical understanding is supported by various studies. First is the importance of managing communication methods, in which clear content with cohesion and coherence especially during the innovative product launching phase (Zhang et al., 2021). Meanwhile, Kasper, Pohl, and Kochanowski

(2021) argue that the format of communication matters to ensure successful communication for innovative products. For them, artifacts designed can help the communicator to deliver the intended aim. Relationships in the innovation networks would also determine the success of Innovation (Prokopenko&Omelyanenko, 2021).

The notion that resources management is necessary can be applied to a school setting. School as a formal education institution addresses educational issues and provides innovative solutions in various forms. For instance, Zhao et al. (2021) research shows how schools in China implement teaching thinking as an innovative instructional method. A study by Vermeir and Kelchtermans (2021) presents the fact that educational advisors would facilitate the implementation of innovation. As for Altinay et al. (2020), a deep understanding of a teaching tool is pivotal to create a better practice in educating students. The conclusion of these studies shows that schools did try to manage resources to ensure innovation success.

Founded on this fact, the authors' research presents determinants of innovation success in a school setting from a more holistic perspective rather than focusing on one aspect. It also explicates these determinants from a dynamic capability perspective. The reconstruction of innovation dynamic capability from the school context would bring to light a new proposition for school leaders. From a theoretical standpoint, this research provides novelty for development in dynamic capability theory when

dealing with non-product-based organizations. As school is characterized by its focus on human development, rather than profit based on the selling of products; the dynamics contributing to this theory would also change. This research contributes as a reference point to strategize and manage innovation initiatives in school settings. Experiences and takeaway points can potentially reduce the failure rates in implementing innovation.

Resource Based View (RBV)

Resource-Based View (RBV) is a prominent theory in strategic management, starting with Wernienfelt (1984). From his view, a firm would have to manage resources and products, especially on how resources can be used to create multiple products. One of the consequences of such action will be the creation of products with a limited number of resources. The author argues that every firm must answer how owned resources must be diversified and developed. Moreover, steps in this process should also be considered. There is even a mention of other firms taking over to gain resources. Successfully managing all of these factors would enable firms to generate more profits. In short, this theory can answer why and how resources should be managed by firms.

Research about RBV is plenty, including its development and application in multiple disciplines, even in recent years. A study conducted by Campbell and Kubickova (2020) study how RBV frameworks can be analyzed in agritourism microbusiness in Honduras. The report suggests that various resources should be managed for micro business success. These resources are categorized as two. The first one is business resources which are the business orientation, social capital, social network ties. Secondly, structural resources which include promotions by the small business, brand identification, and financial resources. Naseer et al. (2021) present new dimensions of resources to be managed in an enterprise cybersecurity context. These dimensions are real-time analytics capability, incident response agility, cyber threat environment, and enterprise cybersecurity performance. Zend, Tavalaei, and Khan (2021) present RBV usage from the perspective of a sharing economy. They indicate three mechanisms for firms in China when orchestrating their resources. RBV contributes as the basis for these firms to adapt their on-demand resource, big-data management, and ecosystem resource coordination. Meanwhile, Gueler and Scheinder (2021), research regarding RBV is extended to find determinants of valuable resources. Their model showcases four propositions namely contribution to value proposition, scarcity, complementarity, and reputation of input provider for the resources.

Despite the prominent existence of this theory, one of the main critiques for RBV is on the circular reasoning behind resource management. As mentioned by Omalaja (2011), RBV lacks in

answering a simple notion. The ability to manage resources can lead to firms achieving a competitive advantage. Yet, it then creates competitive structures due to competitors' presence in the market. Furthermore, these competitive structures would then enable the creation of other sources deemed valuable. Consequently, firms would have to continue creating more valuable resources. However, this theory serves as a foundation for firms to manage their product portfolio and innovation.

Innovation Capability Management

In response to the realization that managing resources are critical to firms' success, then the notion of managing capability is in place. Capability management is more prevalent in dealing with innovation. Innovation capability deals with factors that firms need to manage due to changes in the external environment (Muskat et al., 2021). As a result, firms need to align their internal innovation capability with these changes. Three stages are in place to accommodate the output of innovation capability, namely ideas generation, development, and implementation. It is argued that when firms are able to properly employ this strategy, then the firms' performance will increase. Naranjo-Valencia et al., (2019) argue that firms with strong innovation capability can gain first-mover advantages because they are rooted in a strong capability to seek new market opportunities, create ideas, and develop new solutions. Firms will also be able to protect themselves from competitors.

Research on innovation capability is all rooted in understanding RBV. Innovation capability is seen as the key determinant of pioneering orientation for hospital and travel-tourism firms (Ortega et al., 2021). Interestingly, the study found that competitive intensity can strengthen this practice in firms. At the same time, changes in technology will weaken it. Innovation capability for SMEs was also studied by Muskat et al. (2021). They found that knowledge-learning and employee participation are two of the key determinants of innovation capability management. Moreover, in a short-term-oriented culture, the practice would benefit from profit and incentives for staff. Pascual-Fernandez et al. (2021) argue that innovation capability, especially from the context of the hotel industry, can be driven by innovative culture yet with internal marketing and market orientation as mediators. They also found that hotel managers should improve their innovation capability skills since it can improve financial performance, especially through the improvement of customer equity. Top management is also seen as a crucial part of developing innovation capability, especially regarding their cognitive diversity. By having this factor, ambivalent interpretation can be achieved. Consequently, both incremental and radical capacities to innovate would be achieved.

The concept of innovation capability management is not obsolete yet can be seen from a

more modern perspective. As change is a constant factor, both from external and internal firms' management, firms would then have to address the dynamics of antecedents of innovation capability. Continuous assessment and re-configuration would be the key to success (Teece, 2007). This concept is then known as dynamic capability management.

Innovation Dynamic Capability Management

Dynamic capability started with Teece (2007) research regarding how organizations need to understand and develop their resources. It is a modern development from the Resource-Based View (RBV) theory of the firm (Wernerfelt, 1984). From RBV theory, it is well known that organizations need resources to be able to win the competitive market. Resources would have to be diversified and managed by leaders. To do so, actions could be taken including merger and acquisition and other growth strategies. Yet, this theory is not yet addressing the dynamic changes in the external environment and capabilities of leaders to build resources needed.

The understanding of dynamic capability would enable organizations to build their capabilities, grow, and gain a competitive advantage, which in return turn into profit. Strategic management theory, including resources and capability management, are the core in addressing this challenge. Organizations that need to coordinate and manage resources as well as applying continuous learning to increase the capability to manage these strategic assets.

In building capability management skills, organizations should continuously do reconfigurations due to external changes. Alignments of these resources include understanding preferences in the market, validating business problems and acting by realigning assets. Leaders must also have the agility to think, act, and envision the future. Besides top leaders, organizations as a whole need to have this concept embedded in their values, culture, and ability. This notion is more important as changes are constant and need to be addressed by implementing necessary adjustments.

Dynamic capabilities steps consist of: (1) sensing and shaping opportunities and threats; (2) seizing the apparent opportunities, and (3) maintaining the competitive level by continuously reconfiguring both tangible and intangible assets (Teece, 2007). By implementing these steps, organizations would enable the creation and enhancement of values necessary for the creation of competitive advantage. Consequently, variables to determine long-term success in organizations are in constant change (Teece, 2017).

Research on dynamic capability management, especially in innovation can be found in many industries and formats. Hutton, Demir, and Eldridge (2021) showcase that the open innovation concept in the manufacturing industry can lead to the development of dynamic capability. It can happen because, during the implementation of open

innovation, firms can exploit technological and market-based knowledge. Afterwards, firms can implement what they acquire internally. Robertson, Caruana, and Ferreira (2021) break innovation dynamic capability from a knowledge perspective. Knowledge diffusion, creation, impact, and absorption are seen as the determinants. Their research on three types of economies in the world: developed, transition, and developing suggests that all these factors are strong predictors for a country's innovation dynamic capability. For social innovation, Tabaklar et al. (2021) suggested that three dimensions of dynamic capability are required. These dimensions are sensing, seizing, and reconfiguring. For firms, sensing requires the ability to scan capability, analyze the relationship, and learning capability. In seizing, three determinants are required namely conflict resolution, relationship management, and dual capabilities to build and supply. Meanwhile, reconfiguring requires firms' capability to orchestrate resources and agility to move. Smart city development can also be developed by implementing three dynamic capabilities. As studied by Linde et al. (2021), these three capabilities are ecosystem sensing, seizing, and reconfiguration. Particularly for this context, three main capabilities are the configuration of partnerships, deploying values, and governing alignment.

2. RESEARCH METHOD

The aim of this research is to provide a proposition on innovation dynamic capability management in a school setting. Thus, a suitable method of research is the qualitative multiple case studies method (Yin, 2003). To collect data, the researcher uses purposive sampling and interview methods (Creswell and Creswell, 2018). To be informants, characteristics that match with this research are school leaders in Indonesia currently serving as the school owner, headmaster or director, or head of a unit in their school. These informants are AA (Headmaster from Tegal, West Java, Indonesia); RP (Associate Director of Learning from a multi branch schools in Indonesia); MY (Head of Curriculum from Jakarta, Indonesia); and YK (Head of Curriculum from a multi branch schools in Indonesia). The quality of this qualitative research is based on the triangulation of sources (Creswell and Creswell, 2018).

To analyze the data, a view from Yin (2003) on multiple case studies is in place. The analysis would follow the cross-case analysis method. In this method, cross-case synthesis is built by aggregating individual cases. Reflections of the data set and pattern findings would later enable cross-case conclusion.

3. RESULTS

The results from interviews with all informants are presented as raw data in the following

paragraphs. Using this data, researchers can continue to make discussions by using a cross-referencing method. Researchers then analyze based on patterns shown.

Informant 1: AS

AS is the headmaster in a school in Tangerang, Banten Province, Indonesia. Before being trusted as headmaster in this school, AS was also a headmaster for a school in Tegal, West Java province. He shared his experience in managing innovation for early childhood education school students, particularly in curriculum development. He mentioned that there is a strong perception in society, especially from parents and teachers regarding cognitive skills. According to him, these actors view reading, writing and calculation as the most important aspects of a child's development. Recognition of the 'best' school will then be based on these three skills. He then implemented play therapy combined with the Montessori program. Another form of innovation implemented in his school is changing school and teachers' approaches due to pandemic situations. The teachers implemented digital learning based on children's cognitive development with a focus on analytical and problem-solving skills. In ensuring the innovation programs can be a success, the planning stage is crucial.

AS asking every party to analyze risks when implementing these programs. He aims to create zero mistakes by teachers. He also shared that sometimes innovation can fail to achieve success indicators, especially from the parents' side. The failure usually happens due to a lack of understanding by parents regarding the innovation programs. AS mentioned that this condition can happen due to a lack of constant communication. On rare occasions, teachers might not fully understand innovation programs. To address this, AS put attention to two-way communication that needs to happen between him and the teachers. This solution can be implemented using one to one or within a group of teachers. Mediums like Zoom and WhatsApp are used to enhance the communication process especially due to limitations for face-to-face meetings. AS also implemented an online survey using the Typeform app and other platforms to monitor innovation implementation by teachers and parents.

The main concern for AS from a resources management perspective is the potential collaboration with outsourcing partners for innovation implementation. AS mentioned that the school would need partners especially as trainers for teachers and himself. Moreover, research also plays a crucial part before implementing any innovation. AS would ask teachers to do some research using Google Scholar rather than from newspapers or blogs. Afterward, discussion and brainstorming sessions will be conducted. There is also an emphasis for teachers to join webinars to increase their knowledge and skills, decreasing failure rates. Another important

resource would be facilities and equipment provided to teachers especially during work-from-home situations. The technological part of the innovation project should not make it a burden for teachers' laptops. Financial and budget management need to be managed as well. Innovation ideas should be analyzed both from academic and cost perspectives. Consequently, alternatives of innovation projects should be in place. There is a possibility to look for sponsorships and collaborations if necessary.

Positive reactions can be received by AS if teachers realize the importance of innovation projects. Besides that, when teachers see real changes in students, they usually will show positive feedback. From the parents' side, output in terms of students' achievements plays a significant part. On the other hand, when the output does not represent intended aims, then negative feedback would be received. To measure innovation success, surveys are done for the innovation project, the headmasters, and teachers. By using this method, it helps AS to understand how a particular innovation project is seen from various angles. Evaluation would then be conducted for upcoming innovation projects or to improve the ongoing innovation.

Informant 2: RP

RP previously worked as a headmistress in an international school located in Jakarta. She now moves upward and works as an Associate Director of Learning. RP presented some innovation projects implemented in recent years by the school. The school is focusing on the digitalization of documents, for instance, appraisal for teachers and other documents. Almost all activities that were previously done using hard copies have now already moved to soft copies.

The main challenge for implementing this type of innovation project would be the setup period. The database needs to be created in the system, including for teachers and students. Yet, after the data is already set up, then integration and downloads of data can be done easily. The outcome would be efficiency in working for all members of the school.

RP shared that failure in implementing innovation usually happens due to unknowledgeable teachers or parents especially on how to access the system. Even though the information has already been provided by email to these actors, the problem persists. There was one time that parents lined up in the admin office to ask questions regarding access and fill-in form. According to RP, this situation happened due to different learning methods by teachers and actors, in which text-based communication is not sufficient. Readiness to adapt to innovation is also a contributing factor.

When starting an innovation project, an initial meeting between stakeholders would be conducted. Every member in the school needs to know their parts and how to conduct action items. Leader for the innovation project would also be decided. Continuing

from the internal meetings, emails would be the main channel of communication to other actors, including parents. Meetings with parents are also used as a channel. Weekly bulletins are also sent out to parents with updates regarding this innovation project.

Resources used to ensure innovation success are mainly human resources management. Job allocation and implementation by all actors is the main consideration. The budget also plays a part, however not been seen as a hurdle due to a clear budget set-up since a year before. The school already has a specific post for innovation projects which then can be used during the ongoing school year. Yet, RP mentioned that the main challenge would be awareness and acceptance of changes. Additionally, teachers and staff's adaptability might create constraints. Investment in teachers and staff especially in teaching them would be crucial. Therefore, the onboarding period might be longer than the intended timeline. As for students, RP sees no challenge present as they can adapt very quickly.

Positive feedback is usually received by the school when actors feel that the projects can be easily understood and implemented. However, negative feedback is usually received when a lack of understanding happens. Other than this factor, admin management by the actors can play a part. For instance, RP shared that even emails used to log in to the system can create a challenge. A school parent once complains to the school because he has forgotten his own email account yet blaming the school for this case. To measure innovation success, surveys were then conducted. The surveys are done once a year to parents, including some qualitative feedback. As for admin and teachers, surveys and feedback during meetings are necessary. RP mentioned that parents' evaluation is crucial to ensure that the school can be more competitive in the future. Informant 3: MY

MY is a curriculum coordinator in an International Baccalaureate (IB) school in Jakarta. In previous years, innovation projects were introduced especially regarding learning and teaching methods. For instance, digital portfolio, G Suite platform, agency concept based on IB curriculum. Moreover, online learning methods were implemented, and teacher assistants were taught to be the technological assistants. For the platform, MY's school is now using Toodle to assist the online learning method.

The main challenge for innovation projects in this context is the unwillingness to break from the comfort zone especially by senior teachers. For instance, a digital portfolio project was initially rejected. However, with good strategy and communication, acceptance of this project is within every teacher. Teacher assistants' technology literacy was also a challenge before now is seen as an asset. Reasons for the establishment of these challenges are fixed mindset and unwillingness to move from the comfort zone by the teachers. Teachers also labeled

themselves only as 'teachers'; in which technology literacy was seen as not part of required skill sets.

The process run by the school to ensure innovation implementation is by starting with innovators in school. These are people categorized as having a growth mindset. Furthermore, success moments were then shared among other teachers in forums. Using this method, those that think they are not skilled can learn from their peers. Schools then chose group leaders among teachers. These group leaders are co-constructing how innovation should be designed and implemented. User guide for innovation projects given to teachers in various forms; including slides, multimedia, and private tutorial. Rewards to these group leaders are given to ensure they fulfill the need to be acknowledged by the school.

MY shared that resource management is essential for innovation success. The first one is regarding the budget. The innovation project leader must make a proposal that includes a budget and present this proposal to the head of the school. Secondly, communication via meetings (face to face or online) and other communication channels need to be established. Information is also shared via emails, daily and weekly meetings. The school even asked external informants that shared their experiences and best practices implementing certain innovation projects or technology. In deciding which innovation projects to be implemented, MY shared that understanding the organizational culture would be crucial. Secondly, because the budget does play part in the decision-making process, then a trial period for any innovation project is needed. If after the trial period, more positive feedback were received, then the project would continue. Also, how easy it is for the technology to be set up not just from the school side, but also from teachers, parents, and students are contributing factors in the decision-making process.

Feedbacks received by MY and the school board can be positive especially when the teachers do understand the importance, aims, and output of these projects. MY shared that teachers' sharing sessions would contribute to creating this positive atmosphere surrounding innovation projects. Meanwhile, some negative feedback cannot be avoided for any projects. As explained, a fixed mindset and unwillingness to break from a comfort zone are the antecedents. Some people with 'loud' voices can contribute to creating a negative atmosphere for these projects. These teachers are mostly senior teachers.

To measure innovation success, MY usually uses surveys. These surveys will run periodically, for instance, every three months. Based on the feedback received, the school will then decide whether to continue or evaluate the projects. The minimum satisfaction factor decided by the school is 70%. Other than satisfaction surveys to teachers, feedback is gathered from parents and students; especially for innovation targeted to them. Happiness and

productivity are two main indicators to decide the innovation success of these actors.

Informant 4: YJ

YJ is working as the head of the kindergarten and elementary degrees in a national school with branches all over Indonesia. YJ shares her experience in dealing with digital changes for the school especially since the year 2020. More than 300 teachers are now implementing digital lessons for all subjects. The digital lesson is more than moving offline materials to online, yet it deals with implementing a new structure and system for teaching online.

This innovation started out with research from the development team regarding the needs in the digital collaboration era; particularly involving teachers, students, and parents. Using Google Classroom as the main tool, the development team did simulations for a digital lesson project. Changes were made based on these simulations and feedback received. After the simulation process is evaluated and customized based on feedback, then communication continues to headmasters in Indonesia. From the approaches, feedback gathered, and the digital lesson project is being improved. Lastly, communication continues with the teachers.

Resources managed during this innovation mainly focused on teachers' development. Two focuses were on place: mindset and work culture. Teachers' mindset development was focusing on creating an understanding of the urgency of the digital lesson due to external changes. Teachers were also trained to understand how to create a structured digital lesson for their own subject. Besides human resources, open-source platforms were utilized to the maximum. Teachers were introduced to various platforms that can support their digital teaching process. The decision is also driven by technological easiness, from set-up, requirements, and usability. Leaders in school ensure that when these resources are managed, feedback are continuously gathered to evaluate and improve the innovation project. Budget is part of the consideration, even though not the main issue. Due to the establishment of Google Suite for Education, exploration on how to maximize the tool was conducted.

The decision to focus on teachers' development is mainly due to proximity with students and parents; even though digitally. From interactions with these actors, teachers can gather ground feedback and can provide valuable ideas. Meanwhile, by focusing on open-source technologies, the learning process by teachers can be greatly improved. As for budgetary consideration, the emphasis is more on allowing technology investment to be the accelerator rather than hurdles to implement and communicate innovation to stakeholders.

Positive feedback received by the leadership includes higher motivation and ambition to keep on learning. Most importantly, the understanding that a

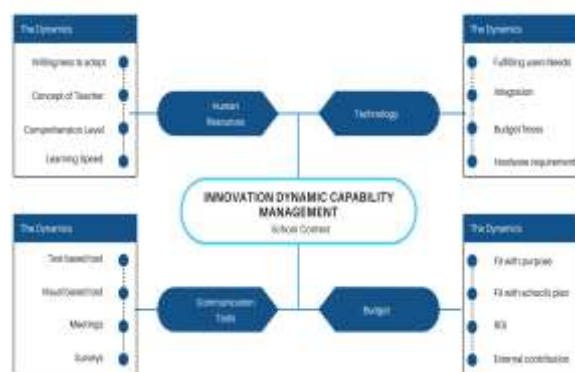
modern teacher is a digital teacher is also established. Teachers also clearly see their students becoming more communicative and creative using structure in the digital lesson program. The minor challenge faced by the leadership is regarding managing fear by teachers; especially doubts on the possibility to implement digital lesson programs.

YJ measures the success of innovation from administration and summative evaluation by students and parents. For administration, school leaders can go into Google Classroom, see and evaluate the implementation of digital lesson programs by teachers and students. As for summative evaluation, students and parents were given questionnaires by the end of the semester.

4. DISCUSSION

Based on interviews conducted with all school leaders, the researchers see four types of resources regarding innovation that need to be managed. These resources are human resources, technology, communication tools, and budget. Each of these resources then has its own dynamics. A synthesis by researchers presents the dynamics for each resource which is summarized in the following model.

Figure 1. Innovation Dynamic Capability Management from School Context



Source: author
Human Resources

Human resources are the main theme emerging from interviews conducted with all informants. These informants place significant focus on managing teachers and staff, while some also include parents and students. The dynamics of this theme consist of willingness to adapt; understanding of the concept of teacher; comprehension level; and learning speed. The first two deal with mindset management and the other two are with the capability to adopt innovation.

Willingness to adapt is always arising especially when dealing with teachers and staff. All informants stated that teachers usually stay inside their comfort zone and question innovation projects. It can be concluded that the unwillingness to adopt is the main and most significant challenge posed during innovation implementation. As a solution to this challenge, school leaders then implement more

structured communication methods which include the urgency, aims, and bring into light the possible outputs when the innovation project is implemented successfully.

The concept of teacher deals with an understanding by teachers that technology adoption, digital teaching, and other forms of innovation are not part of their profession. This condition is more apparent in senior teachers. The misconception sends a powerful message that teachers should not see the reality of their job as a constant reality. For this case, continuously creating and implementing innovation can break this mindset. School leaders also stated that much younger teachers and teachers that belong to innovators can help to share success stories. In the end, the peers will eventually see the expansion of their role.

For comprehension level, school leaders see challenges for teachers and parents to understand how to implement and utilize innovation projects. Due to a lack of skills, mainly in technology, the design of innovation projects might not be implemented as perfectly as intended. School leaders see that continuous communication and ways to communicate will be necessary to address it. Moreover, feedback to evaluate innovation projects so they would fit with the needs and challenges of these actors is also required.

Learning speed is a specific factor when dealing with more technologically challenged teachers and even parents. Yet, learning speed is rarely a challenge from the students' side. In this case, teachers and parents need a longer time. Consequently, innovation project implementation might be stalled, or the onboarding period might be longer than expected. To address it, communication with them, including one-on-one meetings and tutorials will have to be in place.

Technology

Technology as part of dynamic capability management is understandable since schools' innovation projects mostly deal with the digitization concept. School leaders stated that various innovation projects are driven by technology adoption, from digitalization of documents, digital lessons, learning management systems, and many others. There are four dynamics to be managed which are the ability of technology to fulfill users' needs; integration capability; budget fitness; and hardware requirements.

Due to an understanding from school leaders that teachers, staff, and parents might have a challenge in implementing technology, then all of them mentioned technology adoption should focus on users' needs. Moreover, with feedback gathered, technology usage will then have to be adopted as well. To address this situation, school leaders implement feedback and evaluation methods within their own schools for technologies they are using.

Based on this process, then decide to continue or re-evaluate certain technologies that are in place.

Technology implemented should be able to easily set up by the school. As mentioned by these school leaders, schools are moving from hardcopies, analog, or from a more traditional sense to digital schools. Therefore, mountains of data are in place. Technological solutions that can make it easy for set-up will be preferable. School leaders implemented a trial period and asked support from departments related to the set-up process to help them.

Concerning technological implementation, school leaders see that budget fitness would be crucial. If technology is too expensive and cannot be justified to the higher-ups, then alternatives would be sought. This condition is critical as the budget might already be decided ahead of technology investment. Besides looking for alternatives, school leaders did opt for open-source technology.

As more teachers need to work from home, then the technological investment should not create a burden for more investment by the school. This case also applies when considering how the new technology can easily be adopted by students and parents from hardware perspectives. As mentioned by one of the school leaders, facilities and equipment are part of the consideration in implementing any innovation projects. As such, asking this question is part of the routine before the decision is made.

Communication

Communication to stakeholders for the innovation projects must be established to bridge schools' intended aims with the users. School leaders see that information sharing and two-way communication would enable them to successfully implement innovation based on both the school and users' needs. There are four dynamics that school leaders are reviewing when deciding on communication tools, which are: text-based tools; visual-based tools; meetings; and surveys.

Text-based tools are one of the main channels to communicate innovation projects to stakeholders. In this case, email to all intended parties is the default. School leaders mentioned that emails will be sent after the implementation of innovation projects as a formal way to announce these projects. However, this text-based tool is not without its limits. School leaders mentioned that not all, especially parents, would read their emails or understand the intended aims and key messages the school is trying to deliver.

To communicate innovation projects, school leaders see that visual-based communication tools are needed as well. This tool is seen as one of the solutions for those stakeholders that did not read their emails or responded poorly. In this context, the visual-based tool is usually done by creating a slide deck and then shared with the communities. School leaders perceive that due to different learning

methods by stakeholders, visuals, rather than text, can be more powerful.

Meetings, both face to face and in an online setting is a common way to bridge school and its stakeholders. Using meetings, quick feedback can be gathered for future evaluation. School leaders usually will have daily or weekly meetings with their teachers. Meanwhile, for parents, the frequency might be less but still seen as necessary. In internal meetings, school leaders can also ask teachers to share success stories with the aim to convince other teachers to adopt an innovation.

Surveys are done to gather feedback from stakeholders, which is done periodically as seen fit by the school leaders. All school leaders see that surveys would be crucial because innovation projects must be improved to fit users' needs. Through survey results, school leaders would know the 'score' given to running projects, the next action steps, and the possibility to cancel the projects. School leaders would ask for satisfaction, happiness, and other indicators as they see fit.

Budget

The budgetary concern is closely linked with innovation projects since it will be required from the setting up to maintenance purposes. All school leaders mentioned the budget issue, even though it is not seen as the main driver for innovation implementation. There are four considerations for the budget: fit with purpose; fit with the school's plan; Return on Investment (ROI); and external contribution.

Before spending any money on innovation projects, school leaders will analyze how fit is the innovation with their purpose. Even though some projects might require larger budget investment, school leaders see that value triumph over money investment. School leaders will create proposals and discuss with their supervisors any technological investments they need to make. During discussions, school leaders can fight for certain technological investments if they see how they can fit to solve problems. Yet, this mindset is not without considering the school's financial situation.

Since schools will plan their budget ahead (usually on an annual basis), then school leaders would see and set their innovation projects investment accordingly. Some of these school leaders know their exact budget and some will need to have further discussions with their supervisors. There is even a possibility to re-allocate the budget as investments required might experience changes. In this situation, school leaders would justify the decision, especially using fit with purpose arguments.

School leaders also see ROI as a driver for the decision-making process. Yet in this context, none of the school leaders see ROI in terms of monetary paybacks. They think ROI is mainly in terms of satisfaction by users. Other than this indicator, usability and productivity are also in place. During

the evaluation process, each school will have its own minimum thresholds for innovation success. For instance, one school leader mentioned it to be at least 70% acceptance.

When innovation projects budget requirements do not fit with budget availability, then school leaders also try to find alternative solutions. One of them is by looking at the possibility to collaborate with external parties. The collaboration can be in the form of sponsorships or other creative solutions.

As explained, these four resources and their dynamics are drivers for innovation dynamic capability management in schools, each with its own uniqueness and focus from school leaders. Based on the cross-referencing analysis, human resources play a more important factor compared to the rest. All school leaders put emphasis that the dynamics of managing human resources, mainly teachers and parents, drive their decision-making process and evaluation of innovation projects. It brings into light the notion that innovation is designed for humans.

5. CONCLUSION AND RECOMMENDATIONS

To the authors' findings, this study is the first one that mapped out what and how school leaders manage innovation resources and their dynamics. By combining these four resources, school leaders can strategize innovation in their own schools. Human resources, technology, communication, and budget with their own dynamics are fundamental resources managed uniquely yet with silver linings as stated by these school leaders. From these determinants, human resource serves as a catalyst to ensure innovation success. Teachers and parents should be the focus of innovation implementation, as students are seen as the more capable actor in receiving and using innovative solutions. Theoretically, dynamic resource management is enhanced from this viewpoint.

The findings and analysis in the previous section enable the authors to provide three recommendations for future research and practical implementation regarding this topic. Firstly, on future research, the authors see potential research that specifically focuses on managing the human aspect. Considering evidence that school leaders mostly focus on teachers' awareness and adoption of innovation, thus the potential for focus research in this area is crucial. Secondly, the authors recommend research on the dynamics of budgeting for innovation projects. School leaders mentioned the importance of setting up and using the budget correctly. Yet, the detailed process can be explored further. Lastly, this model serves as a foundation and can be tested on the general population of school leaders for wider evidence of its existence.

As for recommendations from practical aspects, the authors recommend school leaders dive into the co-creation aspect of innovation. The

research results showcase that innovation in these schools started from the top to bottom approach. Even though teachers can provide feedback during the implementation phase, however, ideas are not driven from them. Enabling organizational practices that allows teachers to take a more proactive approach in sounding their ideas would bring benefits to the process of implementing innovation. The authors also see potential collaboration between school and parents in a similar light with teachers' collaboration. From the innovation dynamic capability management perspective, the authors see that a more structured and efficient process can emerge when school leaders analyze and implement innovation project strategy by considering these four dynamics.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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