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Exploring the Role of Technology in Brunei Darussalam's Public Sector during Strategy Implementation

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Abstract

The paper explores and isolates factors related to the role of technology during strategy implementation in the public sector. In pursuit of the objective, the actor-network theory (ANT) is used to explore the relationship between the entities in the public sector in using technology to implement strategy, which does not just involve the technical aspect but also the behavioural and organizational aspects. A qualitative exploratory study can better understand the role of technology infrastructure in the public sector by analysing the conceptions of organizational players that require technology to implement the strategy. Technology infrastructure in the public sector was perceived as an instrument for the employees in the public sector to implement the strategy. In terms of organizational context, technology availability could help them implement the strategy by shortening the time for activities under the strategy. For instance, it can streamline government procedures and provide high-quality public services. Concerning the behaviour context, the behaviour of the employees in the implementing agencies needed to be in line with the technology available where technology is viewed as an enabler and facilitator of behaviour that requires a perception of the system. This study contributes to the present body of knowledge by augmenting the current understanding of the role of technology infrastructure during strategy implementation in the public sector through the ANT view. Evidence confirms that the technology infrastructure does not just influence its technological context, but has an influence on the implementing agencies' organizational and behavioural context.

Keywords: Technology, Strategy Implementation, Actor Network Theory

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1. Introduction

Technology infrastructure has become a vital component in the public sector to cope with the ever-changing dynamic in the 21st century. One of the key areas of technology is that it has become a function in the public sector in providing cost reduction, management support, and most importantly, outreach to constituencies such as citizens, policymakers, employees and contracts (Reddick, 2012). It also helps the public services in terms of the administration, management information systems, analysis, and dissemination of public information, and as tools for service users (Osborne & Brown, 2005). Hence, the use of technology can serve citizens better in a way that service delivery is optimized such as citizens receive a fast, effective and streamlined experience (Ressler, 2016; Van Den Boer, Van De Wijngaert, Pieterson, & Arendsen, 2012). Based on the previous statements, technology is crucial to the whole operation and activities of the public sector.

Technology is also essential in the government's strategic planning (Reddick, 2012). In the implementation of the strategic planning, technology infrastructure contributes to the speedy processes and procedures by giving the organization valuable assistance in implementing new policies, procedures, and initiatives by keeping track of the implementation and performance goals and their achievements (Rajasekar, 2014). Hence, technology infrastructure is a prerequisite to the implementation of strategy. Bryson et al. (2010) also suggested that strategic management model and practices in the public sector should integrate the role of technology infrastructure. Despite its importance, several researchers (Criado and Gil-Garcia, 2019; Reddick, 2012) mentioned that the impact of technologies to foster public creation value remained unexplored from the perspective of public sector management. In addition, Lopes and Farias (2020) indicated the need to investigate the characteristics that must be form in the public governance in order to support collaborative innovation process in the public sector. This is especially apparent when the role of technology infrastructure in the public sector during strategy implementation studies remain limited. Furthermore, research is needed to provide better understanding of the effect of using new technologies (e.g., digital platforms) in the emerging world (Senyo et al., 2021) such as in the countries of South East Asia.

This paper explores and isolates factors related to the role of technology during strategy implementation in the public sector. It provides an idea of the entities that are associated with the utilization of technology which are validated by empirical findings from the Brunei Darussalam public sector. Existing practices in Brunei Darussalam public organizations had limited experience in IT development and deployment Kifle et al., (2009) and the use of technology is quite low within the Bruneian organizations (Kifle, 2008), making Brunei Darussalam public sector organization a good setting for this study. In pursuit of the objective, the actor-network theory (ANT) is used to explore the relationship between the entities in the public sector in using the technology to achieve public sector goals. This view has been especially lacking in the context of the public sector (Carroll, 2014). Actor-Network Theory and the literature on the role of technology during strategy implementation are first discussed. The discussion on research setting and method use follow. Discussion on findings, contribution and limitations of the study are highlighted in conclusion.

2. Actor-Network Theory

ANT is a research method that describes the connection between human and non-human entities to create a new entity that does or does not necessarily derive from the constituent entities (Dankert, 2012). ANT often used in the development and implementation of information system or informational technology (Nehemia-Maletzky et al., 2018). Specifically, it examines how the existing or non-existing technology can influence an entity (Miles, 2012). This includes the relationships and interactions between humans and non-humans in the development of technology (Dennehy & Conboy, 2017). Thus, this theory can be used to examine the relationship between people and machine to achieve goals (ibid) or between actors, processes, politics, environment, policies and networks (Nehemia-Maletzky et al., 2018), either to solve a problem or to create something new or different (Iyamu, 2015).

Although there are limited studies that utilize ANT in strategy making and strategy implementation research area, a significant study by Gao (2005) in its qualitative study can explore the components derived between the interaction of social, technological and environmental during strategy formulation process. In the study, the author observed that the society and the public, the operators of the technology

(telecommunication) and the state reform their political and economic system to align their interest with the market requirements in telecommunications sector. Specifically, their position in the market and their effort to influence change in the market shape the strategy selection, such as low prices from competition and good customer services. With this, it would be worthwhile to use similar theory to explore the interconnected relationship of people, processes and technology in the public sector during strategy implementation.

3. The Role of Technology During Strategy Implementation in Public Sector

Technology infrastructure refers to the information, equipment, techniques, and processes that can speed up the flow of information and communication (Mitic, Nikolic, Jankov, & Vukonjanski, 2017). Duncan (1995) described technology as tangible resources in the form of technologies and telecommunications platforms. Bueno and Salmeron (2008) argued that technology includes communication, cooperation, management support, and training. The government gradually adopts technologies and is frequently used in state and municipal management (Fath-Allah et al., 2014). Thus, the importance of technology has made it a tool for sustainable development in public administration (Nica, 2015). Several studies have proved that technology infrastructure positively affects organizational performance (Mitic et al., 2017; Ruiz-Mercader, Meronõ-Cerdan, & Sabater-Sachez, 2006). Moreover, technology infrastructure has a function for the employees in the organization to deliver the organization objectives (Ponchirolli, 2007).

Despite its importance in facilitating the public sector to achieve various functions, the role of technology infrastructure in the public sector to implement strategy has not been extensively studied. Previously, a study focused on the private sector indicated that technology is being used in strategy making and practice to identify, collect, manage, distribute data and enable adoption of insights and experiences (Jansen, 2012). Various studies that also focused on private sector such as (Heide et al., 2002; Koseoglu et al., 2009) have found that lack of adequate information system can be the reason of failure in the implementation of strategy. In the context of public sector, some studies have mentioned limited technology such as the lack of proper information to implement or evaluate the strategy is due to the government's inability to keep up with

the updated technology (Danaee et al., 2011; Mbaka and Mugambi, 2014). Hence, the deficiency of technology infrastructure in the public sector had become a significant obstacle in implementing the strategy (ibid). Therefore, in line with this understanding, the ANT's potential as a basis to understand the influence of technology on public sector entities during strategy implementation can be utilized.

The Internet of Things (IoT) is an emerging technology that will be key to the realisation of smart public services (Velsberg et al., 2020). Not only technology infrastructure help an organization to implement strategy, it also facilitates the entities in the organization to achieve its organizational outcome. For example, Chakravarty, Vonderembse, Zhang, & Ragu-Nathan (2013) explored the competency of IT to complement responsiveness in order to achieve competitiveness and performance. Technology facilitates knowledge sharing to enhance dynamic capabilities (Sher and Lee, 2004). Another example is that Dewett & Jones (2001) stated that technology affects organizational characteristics (organization structure and culture) in achieving organizational efficiency and innovation, thus generating synergies and enhancing teamwork across the organization. Another study by Tayal, Kumar Upadhya, Yadav, Rangnekar, & Singh (2018) has proven that technology positively affects transformational leadership to empower employees to accept organizational change.

In the context of strategy implementation, a study by Palladan, Abdul Kadir, & Chong (2016) has argued that leadership can mobilize technology infrastructure to implement the strategy. Another example is that the efficiency and effectiveness of activities for strategy implementation can be strengthened through the use of technology as it facilitates the whole operation and activities side of the public sector (Boynton et al., 1994). It also strengthens communication by employing a more direct and faster contact with stakeholders (ibid).

4. Research Setting

The public sector in Brunei Darussalam has given high priority and importance to the effectiveness of the government in providing good and services to the public (Nor Amin, 2018). Recently, the civil service's has moved away from its conventional role of provision of goods and services to facilitate growth and development (ibid). The

formation of an institutional development strategy in 2007 aims to foster good governance in the public sector. The strategy is particularly important because Yapa (2014) held the view that the public sector in Brunei organizational performance is limited. In addition, the author viewed a lack of knowledge and awareness about any changes in the public sector (ibid). The movement towards utilizing technology infrastructure in the public sector has been realized even before the formulation of the strategy, whereby e-Brunei has already been emphasized since 2000 (Kifle, Low, & Cheng, 2009). Thus, allocation of approximately of B$526 million to nearly B$1billion was seen in the 8th National Development plan for the development and implementation of infrastructure for the e-government ("Brunei Darussalam Public Sector Journey Towards E-Government", 2003). This is mainly to ensure that the public sector provides better service from one government to another and from the government to citizens and business (Kifle, 2008). This indicates that the public sector in Brunei Darussalam has realized the importance of technology infrastructure to facilitate the public sector while at the same time, to facilitate the implementation of the strategy to reach good governance.

5. Methodology

There is a dearth of research concerning the role of technology infrastructure in the public sector in Brunei Darussalam. The role of technology infrastructure in the public sector can be improved by studying the understandings of relevant organizational actors that require technology to implement strategy. Through a qualitative exploratory study, the multifaceted role of technology during the strategy implementation process can be explored through its emerging themes. The qualitative study adopted in this study is in a form of semi-structured interview, whereby it allowed flexibility in both interviewer and interviewee. Furthermore, the interviewee is free to express their views (Stuckey, 2013) and to gain insight into the information that relates with the complexity of the phenomenon under investigation (Saunders *et al.*, 2009). The conduction of semi-structured interview can also increase the content validity as the semi-structured interview is done in situations where the focus of the investigation is clear and specific issues are elaborated when needed (Bryman and Bell, 2011). This technique allows the researcher to clarify specific points by asking probing questions during the interview to

enhance more understanding, hence garner knowledge about the respondents' views regarding the role of technology in implementing the strategy.

Sample size

In terms of the sample size, Silverman (2006) and Saunders et al. (2009) stated that the sample size in a qualitative research is depending on a variety of factors, such as the objective of the study, and the availability of time and resources on the part of the researcher. Dworkin (2012) stated that a large number of articles, book chapters, and books suggested sample between 5 to 50 participants as adequate. With this rule of thumb, a total of 19 key informants' representatives of four public implementing agencies were interviewed. The main benchmark for selecting the participants was homogenous purposive sampling, whereby a certain criterion is used to filter the sample and purposefully select respondents. In addition, a homogenous sampling enables a researcher to choose settings, groups and individuals based on similar or specific characteristics (Collins *et al.*, 2006). Since the research is concerned with the firm management and strategy, the sample was drawn from a cross-section of the employees of the division of managerial positions, executive and officer level that are involved in the operation of the strategy implementation. This is because the role organized by local government jurisdictions and public authorities are led by top executive function and extends to other management levels in the public sector. Furthermore, Ackermann & Eden (2011) and Poister & Streib (2005), strategy implementers in the public sector involved the senior executives, strategic planners (specialized internal planning department), middle managers (department heads and the staffs (lower-level employees). Thus, within a total of thirteen ministries in Brunei Darussalam public sector, only two ministries were responsible for the implementation of institutional development strategy, namely Prime Minister's Office with 5348 employees and Ministry of Energy, Manpower and Industry with 1336 employees. Within these ministries, only some departments, divisions, units, and employees are liable to implement the strategy. To honor confidentiality, only the categories of the interviewees' organizations and their position have been provided in table 1.

Table 1. Categories of informants' organizations

Interviewee (INT)	Gender	Position	Department/Unit
1	Male	Deputy Director	Organisation 1
2	Female	Officer	Organisation 1
3	Male	Officer	Organisation 1
4	Female	Officer	Organisation 1
5	Female	Officer	Organisation 2
6	Female	Officer	Organisation 2
7	Male	Officer	Organisation 2
8	Female	Officer	Organisation 2
9	Female	Officer	Organisation 2
10	Female	Assistant Director	Organisation 3
11	Female	Director	Organisation 3
12	Female	Assistant Director	Organisation 3
13	Female	Head of Unit	Organisation 3
14	Female	Head of Unit/Officer	Organisation 4
15	Male	Director	Organisation 4
16	Female	Assistant Director	Organisation 4
17	Female	Officer	Organisation 4
18	Male	Assistant Director	Organisation 4
19	Female	Officer	Organisation 4

Data analysis

This study utilized a manifest data analysis developed by Bengtsson (2016) to investigate the statement made from the interview. The manifest data analysis involves data from the interview to be described as closely as possible to what the participants say and using the obvious and visible texts of the informants for the qualitative results (ibid). With the amount of data produced from the interviews, RQDA (R package for Qualitative Data analysis) software was used as it can index, record, store, sort and retrieve large data with the strength of creating flexible and visible coding (Chandra and Shang, 2017).

The first stage of the manifest data analysis involved the contextualization of the data by the process of coding. The data gathered from the interview were transcribed immediately after each interview and was listened twice for its accuracy. Before analyzing the transcript, an ode list was first created to generate the 'key points' based on the literature of the role of technology in strategy implementation. The quotes from the first interview are assigned into a prior code taken from the ode list during the coding process. The codes were adjusted repeatedly throughout the interview analysis. This way, the codes developed are rich with explanation, subsequently connecting and reflecting

the topic of the research (Yin, 2003). The coding process utilized the color code because it easily organizes the dataset (Babbie, 2011). Since the data that emerged can be quite large, the data that have the same words, phrases, and meaning are put in the same color code. Another researcher was asked to listen and re-check the transcripts' code to ensure the coding process's reliability (Miles & Huberman, 1984). From this, the results were compared, and no major amendments were required. The second stage involved the classification of the codes into fewer themes, which were identified beforehand. This process can reduce the volume of text collected and group the text into categories to seek some understanding of it. Each theme was then studied to identify the codes to add meaning and depth to the analysis. In the end, a plot or a web-like illustration can be drawn from the qualitative data analysis (Attride-Stirling, 2001). This ensured the result derived from the analysis of role of technology during strategy implementation in the public sector is conceptualized. As a final check, the informants' words shall be developed as closely as the findings' original meaning and contexts (Bengtsson, 2016). This method allows the researcher to "stay true" to the text and achieve trustworthiness (Patton, 2002).

6. Findings

This section discusses the role of technology in implementing strategy in the public sector. The theme emerged in this study was used to structure the findings of this study. The organizational and behavior context that are affected by the technology during strategy implementation have also conversed.

Technology context

Identify, Collect and Manage Data. One of the expected benefits from utilizing technology infrastructure during strategy implementation include identifying, collecting and managing data. One of the organization roles in implementing the institutional development strategy was to provide leadership excellence by having leaders' effectiveness assessment and leaders' performance development framework. Thus, the implementing agencies used the appropriate technology to identify, collect and manage data of the civil servants for workforce planning and career and development planning:

> *We utilized iLearn system whereby staff members register and access course content provided by the organization. Through this system, every ministry will select and appoint their own training coordinator. So training coordinator will appoint the civil servants to attend the courses that is offer by our organization [INT10]*

Optimize service delivery. Another role of the technology infrastructure in the institutional development strategy implementation is it optimizes service delivery in the public sector through better documentation system. Several respondents consistently mentioned that technology eliminate inefficient systems and help to automate processes. In this regard, the participant highlighted that:

> *We have the tracking system for the clerk to process the documents that will be brought forward to the upper management, so it's easier to trace the whereabouts of the document [INT2]*

Insufficient technology infrastructure. Technology infrastructure was also held to be insufficient. This is because the budget to purchase the necessary technology to implement the strategy is dependent on the central government. This includes constraints such as expensive licensing, implementation, maintenance and training costs.

> *We would like to leverage in ICT, to cut cost, to optimize our infrastructure such as using a certain system. We try to have a system that is coordinated to the higher level of government. And since the ICT is govern by (organization), we have no say on that. [INT13]*
>
> *We have to go through different kind of (higher) government level if we needed certain kind of technology… they need to evaluate the need first in order for it to be approved [INT10]*

Organizational readiness. The insufficient technology has also caused the activities under the strategy to be restrained. Furthermore, since the government sector use one single network (intranet) to access the information and services available on the government's internal intranet, the technology is regarded as domain-specific idiosyncrasies. Interviewees generally agreed that the technology were 'too standard':

> *Technology wise to run the strategy is definitely not ready, even the laptop and computer is old [INT5]*

> *....there is a limitation as we use one government network.. the system is the same… a lot of modification and customizing is needed for each of the organization since we have different roles [INT5]*

Organizational Context

Management Support. In terms of organization context, it was found that technology has provided management support towards the organization structure and communication between the implementing agencies. The interviewees agreed that government is made up of departments with large number of employees, thus, technology gives support in terms of information flows between levels within the company and interaction of the activities of the strategy between the implementing agencies and higher level of government.

> *We have a centralized database system for (people) to submit materials or documents to us. [INT1]*
>
> *We have a tracking system whereby the clerk processes the document for it to be brought forward to the upper management. With this system, we are aware of the status of the document. [INT17]*

Behavioral Context

Interviewees also indicated that the technology affects their behavioral requirements in strategy implementation. The statements below are representatives of this situation:

Adaptable culture. It was considered a key driver for using technology during strategy implementation in the public sector as adapting to them suits the implementing agencies' organizational requirements.

> *I view IT is an enabler and a facilitator, not the solution. I believe that we need to understand the process and the system of doing it so we can implement the strategy much more effectively. [INT7]*

Leadership Influence. As mentioned previously, there are some problems in terms of organizational readiness, whether it is from the higher level of the government to support the initiative or from the implementing agencies to use the technology to implement the strategy. Ultimately, leaders can be the driver to promote technology to implement strategy, and at the same, create positive culture towards the acceptance of technology.

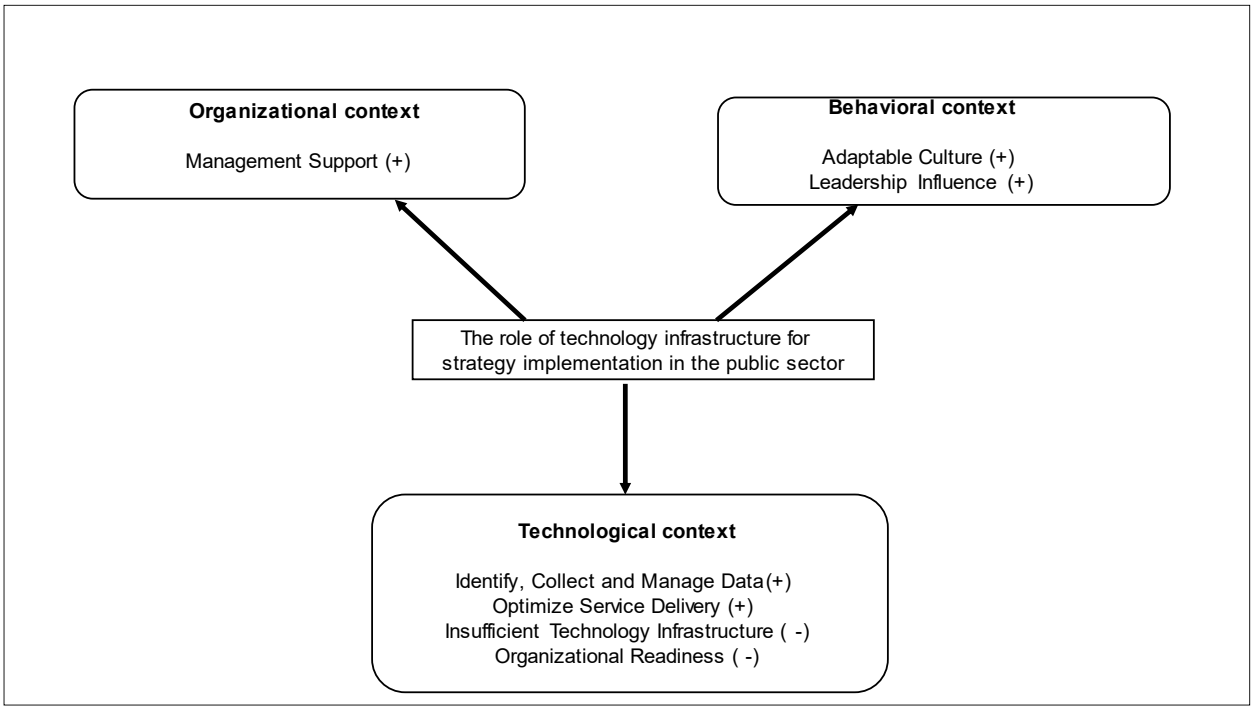
> *If someone stronger (the leader) can drive the information technology (the e-government) to implement the strategy, everyone will eventually accept the technology and finally use the system, so anything that usually takes 2 weeks can be resolved within 2-3days by technology. [INT16]*

7. Discussion

The factors derived from the analysis of the role of technology in the implementation of strategy in the public sector were previously discussed. The interaction of the entities and technology in the public sector during strategy implementation was explored through the lens of ANT. In summary, A concept map is used to summarise the interactions (Novak, 1998). Figure 1 illustrates a rectangular shapes representation of technology context and its element, whereas rounded rectangles represented behavioral and organization context and its elements. The sign beside each factor denotes the focal of the influence of the technology during strategy implementation, namely, enabling (+) or inhibiting (-). The elements are also interrelated using linking suggestions to identify relationships, showing the interactions noted as the role of technology during strategy implementation in the public sector unfolds. Consequently, the map constitutes a step towards understanding factor interactions concerning the role of technology during strategy implementation in the public sector. This finding supports the literature that indicates technology infrastructure affects organizational characteristics such as organizational structure and culture (Dewett & Jones 2001) and leadership (Tayal, Kumar Upadhya, Yadav, Rangnekar, & Singh, 2018).

Technology infrastructure in the public sector was perceived as an instrument for the employees in the public sector to implement the strategy. In Brunei Darussalam's public sector, other than email, the database system is also used for their daily operation as it optimizes service delivery and can also be used to identify, collect, and manage data, thus making strategy implementation process much easier. However, technology infrastructure is perceived as insufficient as technology needed for strategy implementation relies on the central government for endorsement.

Figure 1. The role of technology infrastructure in the public sector



Due to these constraints, the technology available in the implementing agencies are obsolete and outdated. Furthermore, since the technology used in the government is 'standardized' and requires a lot of customization to attain to the need of the specific activities for the strategy, the organizational readiness is reduced. These results match those observed in earlier studies, to which the government's inability to keep up with the updated technological infrastructure has become a major obstacle in implementing the strategy (Danaee *et al.*, 2011; Mbaka and Mugambi, 2014). This has caused information technology to be reported as a source of frustration by those working in the field (Stewart, 2014).

In terms of organizational context, technology availability could help them implement the strategy by shortening the time for activities under the strategy. For instance, it can streamline government procedures and provide high-quality public services. Similarly, past research has proved that technology impacts the structure by increasing the efficiency and effectiveness of activities for strategy implementation through facilitating the whole operation and activities side of the public sector (Boynton *et al.*, 1994; Fountain, 2001). Further, technology can strengthen communication by employing a more direct and faster contact with stakeholders (Boynton *et al.*, 1994).

Concerning the behavior context, the behavior of the employees in the implementing agencies needed to be in line with the technology available. In this study, technology is viewed as an enabler and facilitator of behavior that requires understanding the system. Therefore, the potential of technology can generate synergies and enhance the culture of shared norms and beliefs across the organization (Dewett and Jones, 2001). Furthermore, it was found that leadership's role in influencing technology usage is emphasized. Thus, this agrees with Palladan, Abdul Kadir, & Chong (2016) that stated leadership can mobilize technology infrastructure to implement the strategy.

8. Conclusion

This study contributes to the existing body of knowledge by enhancing current understanding of the role of technology infrastructure during strategy implementation in the public sector which is an under-researched area through the ANT view. By employing manifest data analysis, evidence confirms that the technology infrastructure does not just influence its technological context, however, has influence on organizational and behavioral context of the implementing agencies.

With that being said, in the author's opinion, instead of considering the technology alone for the success of strategy implementation, one should instead focus more on promoting the approach of the ANT view in the organization as an effective way to promote strategy implementation. This means that the organization would be forced to consider its resources and competencies and combine organizational and behavioral aspects as the leadership and culture, which could lead to the success of strategy implementation.

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