



ISSN: 2617-6548

URL: www.ijirss.com



Influence of technology acquisition, external technology exploitation and employee autonomy on the performance of bureaucratic organizations

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Abstract

Organizations use technology to prosper in the digital and technological revolutions. The digital and technical revolution has prompted governments to adopt and use technology to provide effective services to citizens. The purpose of this research is to examine how technology acquisition, external technology exploitation, employee autonomy through open innovation and innovation performance affect bureaucratic people's development. The researcher quantitatively distributed the questionnaire online. Four departments were chosen to collect data from 480 IT-related respondents. For hypothesis testing and correlation, the structural equation model (SEM) was used. The results demonstrated a significant relationship between technology acquisition, open innovation, external technology exploitation, innovation performance, employee autonomy, open innovation and organization performance. The research's findings revealed that an organization's performance can be practically achieved by obtaining advanced technology, external knowledge and the skills of its personnel through open innovation which can drive innovation performance toward organizational performance. Consequently, it indicates that employees and cutting-edge IT are essential for generating new ideas for open innovation and enhancing an organization's performance. Leaders and employees must understand open innovation to maximize themselves and their organizations' potential. In addition, the most important practical implication of this research is that implementing advanced technology, innovation and technology management that includes digital literacy can improve the performance of bureaucratic organizations.

Keywords: Employee autonomy, External technology exploitation, Innovation performance, Open innovation, Organization performance, Technology acquisition, Technology management.

DOI: 10.53894/ijirss.v6i2.1269

Funding: This study received no specific financial support.

History: Received: 1 November 2022/**Revised:** 2 January 2023/**Accepted:** 16 January 2023/**Published:** 31 January 2023

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Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

Transparency: The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Ethical Statement: This study followed all ethical practices during writing.

Publisher: Innovative Research Publishing

1. Introduction

Technology and innovation have increased tremendously in this century influencing a wide range of enterprises. Many companies are concerned with disruptive change and using new technologies to support their operations. Technology is crucial in promoting technological revolutions in order to achieve a competitive edge in many areas. Disruptive change such as the use of contemporary technology, new ideas and management, characterizes the technological revolution and innovation. In regards to disruptive change, many firms particularly Thai bureaucratic organizations must actively modify management methods and work procedures in compliance with technology and innovation. Technology is a tool and an innovation to support or enhance the potential of employees for organizational success. In this regard, technical innovation and innovative engagement significantly help organizations and personnel reach their potential. Organizations attempt to implement innovations in order to enhance their performance and effectively adapt to environmental pressures [1]. Human resources (HR) or employees are an essential part of every company's success and they must be taken care of. As a logical consequence, human resource development may assist a company in achieving its goals and objectives [2]. Nevertheless, organizations may improve in terms of innovation by providing employees with cutting-edge technology, information and training on new skills. In fact, the adoption of innovation in bureaucratic organizations has resulted in the evolution of bureaucratic organizations into innovative organizations with a form of organizational management process that results in organizational performance through policies, structures, systems and management processes in the organization. Accordingly, technological acquisition and external exploitation play a crucial role in advancing creative organization and organization performance in relation to bureaucratic evolution which will be advantageous for both employees and civilians.

As aforementioned, bureaucratic organizations' management information systems (MIS) can help them identify innovative technologies. By exploiting this accessibility, Thai bureaucratic organizations can look for the best experts to collaborate with or engage with to achieve their organizational goals. Thai bureaucratic organizations may access the latest trends, be aware of the newest technology and collect enough audience support to provide meaningful comments by cooperating with these specialists to create a knowledge pool that they can utilize to fulfill their potential regularly. This would help Thai bureaucracies innovations. A prior study explored the impact of technology on innovation but not MIS in bureaucratic organizations. This study fills a literature gap. Digitalization has increased the amount of corporate information and changed communication, government-client interactions and corporate relationships. Thus, enterprises use information technology (IT) differently. Thai bureaucracies that do not adapt will suffer. To prosper in the digital age and boost innovation, organizations must strategically "embrace" digitalization. This gives them a competitive advantage in bureaucratic organizations. Businesses must embrace digitalization in their strategies. This study examines how digitalization affects organizational performance.

Previous studies examined open innovation's impact on business performance. This research uses an integrative approach. It explores how open innovation methods with external technology acquisition (ETA) and external technology exploitation (ETE), MIS in bureaucratic organizations and the digitalization vision affect organizational performance. The integrated strategy will improve the open innovation literature. Since innovation enhancement is one of the Thai government's primary focuses in Changmai, the study's findings raise awareness among Thai bureaucratic organizations about whether focusing on organizational performance through open innovation strategies, particularly MIS technology and digitalization strategies could help them improve innovation and organizational performance.

1.1. Adoption of Technology and Innovation

Today, technological development in our society has increased rapidly. Thai bureaucratic organizations should adapt and use technology and innovation to help firms produce value while remaining dynamic and crucial to the Thai bureaucracy's development. Government organizations employ technology to enhance information flows both within and outside the administration in order to increase the efficacy of public service [3]. Despite the fact that Thai bureaucratic organizations will never have the same profit ratio as private enterprises, their activities must be modified to react to disruptive innovations brought about by global change. On the other hand, Thai bureaucratic organizations must drive themselves to function at a high level. The bureaucratic organization must educate all employees and develop a plan to provide visions or directions that may successfully lead the organization to high performance [4]. As a result, leaders should be in charge of putting the plan into action throughout the process. Furthermore, technology and innovation should be incorporated into the company to produce value in the form of property resources or services. The organization's management must change the activities that are being carried out in accordance with Thai strategy which states that all government sectors and bureaucratic structures must be flexible and adaptable. Furthermore, innovation has an impact not just on the private sector but also on the public sector or government agencies that take action to promote economic growth and people's lives [3]. Technology is a significant instrument for worldwide communication in the age of globalization. Thailand must accelerate in order to be more competitive on a global basis. Innovation and the use of new technologies can have a positive impact on organizational growth and development [5]. When it comes to prepare workers or staff for upcoming changes, leaders' viewpoints are crucial. This means that in order to integrate innovation into the process, it is necessary to take individual expertise into account convince people with favourable or unfavorable viewpoints to make a choice and then apply that choice in the process [6].

1.2. The perspective of Open Innovation in Thai Bureaucratic Organizations

Thailand's bureaucracy is likely to see more open innovation as a result of technological advancements. Every organization must realize the relevance of its strategic plan and educate its staff on the importance of staying updated.

This includes a leader's vision and a plan for open innovation. Furthermore, employee engagement in the development of a work environment allows them to support creativity and stimulate the creation of new ideas [7]. Additionally, while measuring open innovation (OI) performance, organizational flexibility is crucial for rapid adoption of new technologies and knowledge [8]. Open innovation as a new trend for Thai bureaucratic firms may be difficult to comprehend and apply. Employees and the culture of the firm as well as external resources must be integrated in the innovation process. However, openness is not sustainable on its own, it must be supported by collaboration between internal and external organizations in order to exchange ideas and resources [9]. Internal operations in Thai bureaucracies have always been mainly funded by the organization's own resources and employees. To achieve high performance on OI, the Thai bureaucratic organization must prioritize management, process improvement which includes strategy, internal and external knowledge and effective technology acquisition.

2. Literature Review

This section defines the terms used in this study and discusses the factors that influence organizational performance in the context of bureaucratic people development.

2.1. Open Innovation

Open innovation is a new notion that allows leaders to build innovations by leveraging both an organization's external and internal resources. In the open innovation approach, an organization tries to enhance its performance, open the boundary and perceive external knowledge and technology into the organization while simultaneously enhancing its internal knowledge and maybe making it more challenging to actually manipulate all the variable aspects [10]. This strategy is called open innovation. An open innovation strategy's purpose is to drive technology into an organization and increase innovation performance. Innovation is a critical aspect of transforming organizations in both the public and private sectors [11]. Similarly, resource-based insights should be considered in open innovation with knowledge being an element of resource-based insights [12].

2.2. Technology Management

The purpose of technology management is to maximize the usability of an organization's resources. In order to maximize utility, technology management relates to infrastructure, planning and processes based on the technology management process which includes internal and external technology acquisition, technology exploitation, learning and the dynamic capability of using them. However, the internal and external technology that may be integrated and created to deal with dynamically changing circumstances.

The aim of the study is to explore the technology acquisition and external technology exploitation strategies that are capable of enhancing an organization's open innovation in a rapidly-changing environment particularly in Thai bureaucratic organizations. Therefore, technology acquisition is the process of acquiring or adopting new technologies by learning how to utilize them to consistently improve an organization's performance [13]. External technology exploitation involves the acquisition of externally developed, innovative technologies and new knowledge for the purpose of implementation within an organization.

Technology acquisition and external technology exploitation are crucial to enhance open innovation and innovation performance for the success of an organization and should be implemented in the technology management process.

2.3. Innovation and Performance

Innovation performance is a measure of a company's success in terms of its management and operations [14]. The firms' innovation performance reveals their development as well as their inventive capabilities. Therefore, innovation performance is associated with training, education and innovation capacity which collectively provide inventive output [5]. The measurement of organizational learning and innovation performance helps employees understand how companies use external information or knowledge [15]. Similarly, an organization's innovation activities including research and development (R&D) should be implemented in order to improve its innovation performance [16]. Furthermore, innovation skills will improve the inventive performance of organizations that rely on open innovation. Innovation performance refers to the results of inventive abilities in relation to processing implementation and improvement. It entails the amount of knowledge, training and technology acquisition required to execute the performance evaluation in accordance with the innovation plan. In order to accomplish organizational performance, innovative procedures and strategies may be used to enhance innovation performance. Moreover, to achieve the innovation performance of an organization, employee autonomy also plays an important role in allowing employees to create works or activities that can support the innovation performance of the organization. Employee autonomy is a key characteristic of work design that is favorably connected with creativity and innovation results [15].

2.4. Organization Performance

The performance of an organization is determined by its systems and resources including its personnel's efforts and performance. According to Taouab and Issor [17], organizational performance is defined as "an organization's success which displays an organization's capacity to achieve its goals [18]". For an organization to attain outstanding performance, its inventive ability must be developed. In addition, organizational success depends on the organization's strategy, internal processes, organizational capacities such as training and human resource development and an innovative system. Achieving

organizational performance in support of this study relies on innovation performance and technology management helps to align decisions with process implementation.

Thus, the conceptual model of this study is established as shown in Figure 1.

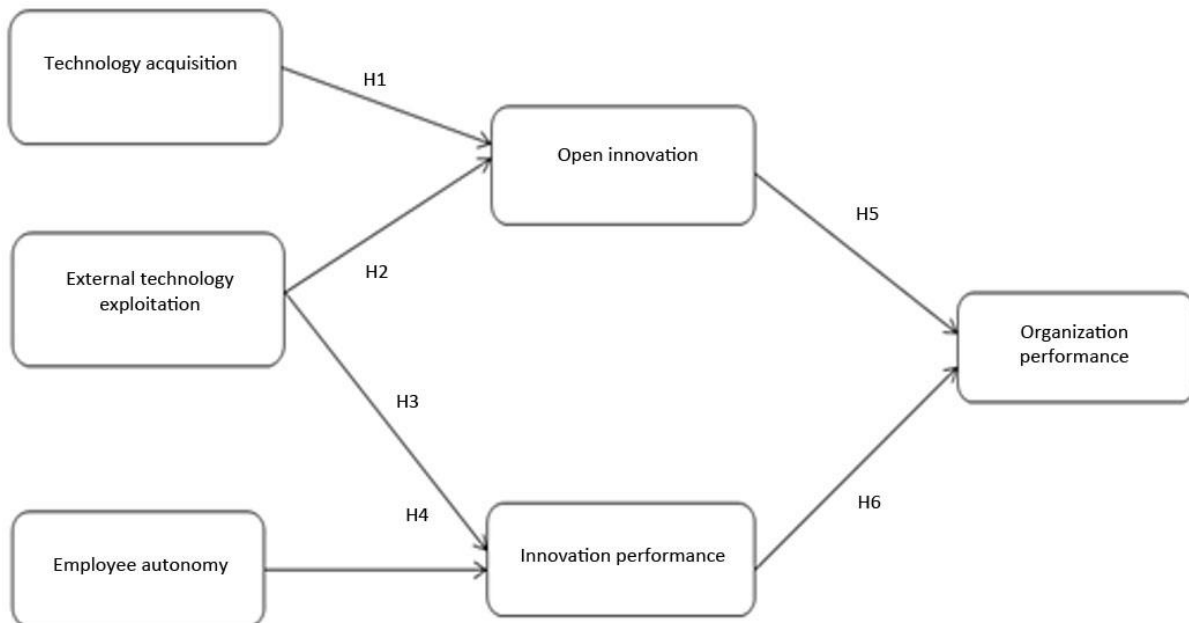


Figure 1. Conceptual model

3. Research Methodology

The quantitative research methodology was employed and 480 respondents from four Thai bureaucratic organizations in Chiang Mai, Thailand which had the same organizational structure and system were surveyed through online questionnaires. The questionnaire was divided into three sections. To begin, screening questions were used to qualify the target audience. Second, the demographic questions were used to interpret the sample group's characteristics. Finally, a five-point Likert scale was employed to assess the items in this study. Prior to data collection, the Item Objective Congruence (IOC) validity test with three expert evaluations and the Cronbach's alpha reliability pilot test with 70 respondents were used. According to the IOC findings, no questions were eliminated from the questionnaire out of a total of 18 items from six variables. For each structure, acceptable alpha coefficient values were greater than or equal to 0.60 [19].

In this study, it was hypothesized that technology acquisition, external technology exploitation and employee autonomy influence organization performance through open innovation and innovation performance as mediating variables. Therefore, this study is concerned with the effects of technology and human resources on organizational performance.

4. Results and Discussion

This study focuses on the influence of technology acquisition, external technology exploitation and staff autonomy on the performance of bureaucratic organizations. Prior research by Tajudeen, et al. [20] has explored the relationship between these variables and the improvement of organization performance but there has been limited study on open innovation and its effect on organization performance. This is the reason why this study was conducted in order to support the performance of the Thai bureaucratic organization.

Accordingly, Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM) were employed to measure direct and indirect effects in order to test the model hypothesis.

The suitability of the model was assessed based on the basic limit values (see Table 1).

Table 1. Analysis for measurement model.

Index	Acceptable value	Measurement value	Result
CMIN/df	< 5	3.679	Acceptable
RMSEA	< 0.1	0.073	Acceptable
CFI	≤ 1	0.898	Acceptable
NFI	≤ 1	0.867	Acceptable
RMR	<0.05	0.029	Acceptable

Note: CMIN/df – the Minimum discrepancy function by degrees of freedom divided.
 RMSEA – Root mean squared error of approximation.
 CFI – Comparative fit index.
 NFI – Normed fit index.
 RMR – Mean square residual.

This table indicates that all the values are close to agreement. However, throughout the standard of fit in CFA with n = 483 including CMIN/DF < 5 indicating an acceptable fit, RMSEA < 0.1, CFI, NFI ≤ 1 and RMR [21] < 1 indicating an acceptable model [22]. Therefore, it can be explained that the model is reliable and acceptable.

Table 2.
Hypothesis result of the structural model

Hypothesis	Paths	Standardized path coefficients (β)	T-value > 1.96	Results
H1	Technology acquisition (TA) → Open innovation (OI)	0.030	10.733***	Accept
H2	External technology exploitation (ETE) → Open innovation (OI)	0.210	9.542***	Accept
H3	External technology exploitation (ETE) → Innovation performance (IP)	0.020	9.565***	Accept
H4	Employee autonomy (EA) → Innovation performance (IP)	0.025	10.559***	Accept
H5	Open innovation (OI) → Organization performance (OP)	0.023	10.087***	Accept
H6	Innovation performance (IP) → Organization performance (OP)	0.220	10.049***	Accept

Note: *** p < 0.001 [23].

The results of the structural model in this study align with Table 2. β - A path coefficient indicates the direct effect of one variable as a cause of another variable.

This table illustrates the direct relationship between all the factors. The results show that the path coefficient between technology acquisition 0.030 (H1) has a significant relationship. The path coefficient between external technology exploitation and open innovation is 0.210 (H2) which is a high value implying that it has a strong relationship. It explains that open innovation can be supported by technology acquisition and external technology exploitation. The path coefficient between external technology exploitation and innovation performance is 0.020 (H3), employee autonomy and innovation performance is 0.025 (H4) and they have a significant relationship. The path coefficient between open innovation and organization performance is 0.023 (H5), innovation performance and organization performance have a significant relationship. Thus, technology acquisition, external technology exploitation and employee autonomy have an indirect effect on organization performance but a positive effect when mediated by open innovation and innovation performance.

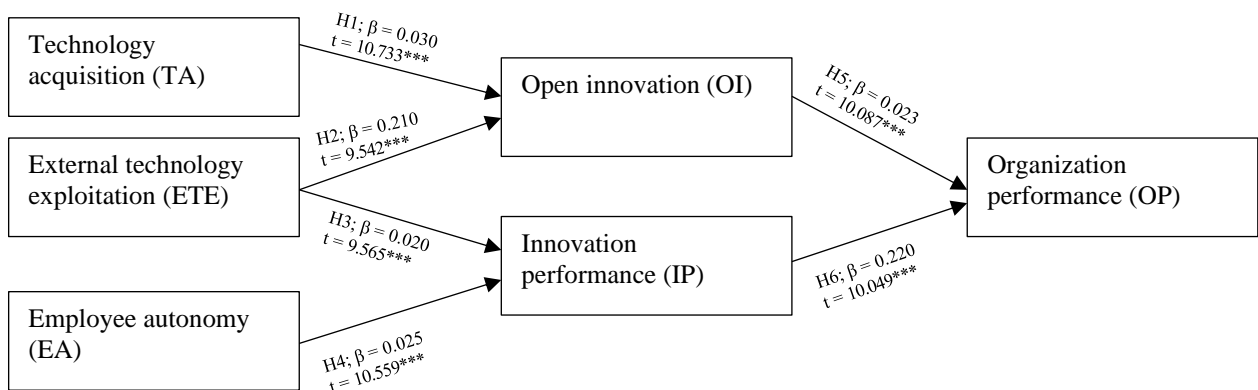


Figure 2.
The results of the structural model in this study.
Note: *** p < 0.001 [23].

According to the statistical results in Table 2 which demonstrate that there is a significant (t-value = 10.733, p<0.001) and positive (β = 0.030) correlation between technology acquisition and open innovation, the analysis confirms the relationship between technology acquisition and open innovation. The hypothesis (H1) is supported indicating a direction linear causal relation between technology acquisition and open innovation (H1: TA→OI) as shown in Table 2. In addition, the testing result reveals that this study is consistent with the findings of the study by Zanjirchi, et al. [24]. Technology acquisition is necessary and capable of improving employees' skills or knowledge in order to achieve open innovation in bureaucratic organizations as supported by the previous study that found organizations can improve their internal innovation with new methods to leverage knowledge and innovation toward open innovation by acquiring and integrating technology for research and development operations.

In conclusion, with regard to the first hypothesis result, it was proved that technology acquisition has an influence on open innovation which explains that in order for organizations to become more proactive, technology acquisition within an organization would be able to assist this under an open innovation policy.

According to the findings of hypotheses 2 and 3, external technology exploitation has a significant (t-value = 9.542, $p < 0.001$) and positive influence on open innovation ($\beta = 0.210$) as well as a significant (t-value = 9.565) and influence on innovation performance with a high correlation ($\beta = 0.020$). It proved that external technology exploitation has a significant influence on open innovation and innovation performance. It indicates a direction linear causal relation between external technology exploitation and open innovation as well as innovation performance (H2: ETE \rightarrow OI; H4: ETE \rightarrow IP) as shown in Table 2.

The outcomes of the tested hypotheses (H2 and H3) aligned with previous studies by Zanjirchi, et al. [24] and Tajudeen, et al. [20]. Therefore, the result of testing hypotheses 2 and 3 implies that external technology exploitation (ETE) has a significant influence on open innovation and innovation performance. External technology exploitation (ETE) which is to bring new technology and knowledge from outside to stimulate creativity and produce innovation activities within an organization was also investigated. In addition, external technology exploitation has the tendency to accelerate their innovation performance in order to drive organization success.

Regarding technology, it is a vital aspect that will be used to define open innovation which mixes internal and external technology and knowledge depending on the goals of leaders and employee cooperation which is essential for improving an organization's innovation performance.

According to the hypothesis (H4) results, employee autonomy has a significant (t-value = 10.559, $p < 0.001$) and positive influence on innovation performance with a high correlation ($\beta = 0.025$). It shows that employee autonomy has a significant influence on innovation performance. Table 2 shows that the hypothesis testing of H4 is supported and demonstrates a direction linear causal relationship between employee autonomy and innovation performance (H4: EA \rightarrow IP).

According to confirmation of H4 of this study, the previous research by Burcharth, et al. [15] investigated employees who were encouraged for their creative efforts but not under time constraints, they persevered with their idea creation attempts and those efforts were able to support innovation activities that affected innovation performance. Therefore, it implies that employee autonomy positively influences innovation performance. The result is consistent with Burcharth, et al.'s [15] study on the relationship between employee autonomy and innovation performance based on open innovation.

This result demonstrates that Thai bureaucratic organizations need to encourage employees to make independent decisions in order to advance the innovation process. Employees are capable of producing more creative work making independent decisions and completing assigned tasks which enhances innovative performance. Employees are a crucial aspect of this study that can drive innovation within an organization. Employee autonomy increases the likelihood of ideas being generated and the organization's ability to achieve high levels of innovation performance. In addition, the design of work can have a considerable impact on how people engage in creative and innovative activities [25].

As demonstrated by hypothesis 5 testing, open innovation has a significant (t-value = 10.087, $p < 0.001$) and positive influence on organization performance with a high correlation ($\beta = 0.023$). Table 2 shows that testing of H8 is supported and demonstrates a direction linear causal relationship between open innovation and value creation (H5: OI \rightarrow OP). Accordingly, it is consistent with the previous studies of Zanjirchi, et al. [24] and Bigliardi, et al. [26].

According to Zanjirchi, et al. [24], open innovation can stimulate organizational performance success through the use of innovation technology. The contribution of an open innovation strategy will be able to boost organizational performance as supported by Bigliardi, et al. [26].

Despite the result of H5, it has been shown that open innovation may have a major impact on organizational performance. This study examines open innovation as the willingness to perceive or adopt new knowledge in order to improve an organization. Therefore, open innovation can support organizational performance by implementing advanced technology and fostering employee competency. Additionally, it has been determined that in order to encourage open innovation in an organization, internal and external technologies and knowledge must be considered to increase employee capabilities and organizational performance.

Regarding H6 testing, innovation performance has a significant (t-value = 10.049, $p < 0.001$) and positive influence on organization performance with a high correlation ($\beta = 0.220$). It indicates that innovation performance has a significant influence on organizational performance. Table 2 shows that the testing of H6 is supported and demonstrates a direction linear causal relationship between open innovation and value creation (IP \rightarrow OP). Despite the results, they are consistent with previous studies by Tajudeen, et al. [20] and Bigliardi, et al. [26]. As Tajudeen, et al. [20]; Burcharth, et al. [15] claimed that the effective innovation performance of an organization can help the organization to achieve more jobs which in turn increases organizational performance as supported by Bigliardi, et al. [26].

In addition, the finding of hypothesis 6 reveals that innovation performance has a significant influence on organizational performance. The findings also show that innovation performance is capable of achieving organizational performance. It is plausible to believe that individuals who effectively combine innovative technologies and new ideas can contribute to innovation performance and influence organizational performance.

5. Conclusion

This research investigated the influences of technology acquisition, external technology exploration and employee autonomy on the organizational performance of bureaucratic organizations. It consists of three primary components including technology acquisition, external technology exploitation and employee autonomy which influence organizational performance through open innovation and innovation performance. This research can reveal that an organization's performance can be practically achieved by acquiring advanced technology, expertise from outside and its employees' ideas through open innovation. As a previous study by Farrell and Rudd [27] supported, technology acquisition (TA) and

ETE become advantageous in terms of technological competence and affect performance. Technology and external technology exploitation can have the tendency to accelerate their innovation performance in order to drive organizational success. Moreover, advanced technology and the abilities of employees are also important to drive innovation performance toward organizational performance. Regarding the discussion, all of the variables are interconnected and a clear understanding of open innovation cannot occur on its own, it must be implemented and utilized through technology in an organization. However, employees are the key to using them properly and creating work that can be more effective and benefit the organization. Creativity is vital for innovation performance especially in Thai bureaucratic organizations. Accordingly, creativity relates to attitudes and work behaviors that affect performance [25].

6. Recommendation

According to the findings of this study, there are significant relationships between all variables. The researcher suggests incorporating digital literacy into organizational policy in order to improve organizations. In terms of bureaucratic organization, open innovation can be characterized as a process of developing new methods for operations aimed at resolving issues and supporting civilians.

As aforementioned, adopting advanced technology and innovation as well as technology management is recommended as the key to achieve future success. The open innovation strategy may be used to encourage individuals to cooperate voluntarily. Additionally, employees should be incorporated into the strategy and they must understand digital literacy with regard to open innovation in order to use them effectively and remove the reluctance to perceive new knowledge and external technology in the organization. Moreover, to eliminate redundancy and unnecessary procedures that will be able to make employees work together and independently. In addition, new technology can strive to achieve open innovation and innovation performance.

In conclusion, this research suggests that organizational performance can be improved by considering leaders and employees who must recognize the advantages of open innovation to maximize their own abilities and the organization's performance. Leaders must have a clear vision of where they want their team to go in order to motivate people to reach their objectives by consolidating an open innovation strategy into the organization's procedures. Employee autonomy is very new for bureaucratic organizations and they may not comprehend what it entails because they operate on a hierarchical structure often known as "centralization". Based on the empirical results of this study, employee autonomy allows them to expand their potential and innovate on the job which increases the value of the work. Innovation and organizational performance may be improved by implementing advanced technology, acquiring new knowledge, sharing ideas and establishing an inventive culture. These must be actively implemented in an organization's open innovation strategy. This can increase the performance of both individuals and organizations in terms of innovation.

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