Indonesian Journal of Electrical Engineering and Computer Science
Vol. 32, No. 1, October 2023, pp. 312~317
ISSN: 2502-4752, DOI: 10.11591/ijeecs.v32.i1.pp312-317

Information technology personnel competency towards organizational agility: study at Malaysia automotive

Noor Hafizah Hassan[1], Noreen Izza Arshad[2]
[1]Faculty of Arts and Science, International University Malaya-Wales, Kuala Lumpur, Malaysia
[2]Department of Computer and Information Sciences, Universiti Teknologi PETRONAS, Seri Iskandar, Malaysia

Article Info

Article history:

Received Nov 4, 2022
Revised May 21, 2023
Accepted May 27, 2023

Keywords:

Information technology
Malaysia automotive
Organizational agility
Personnel competency
Responsive

ABSTRACT

Information technology and agility is a core item for organizations. With recent technology and digital transformation in Malaysia's automotive industry, the need to understand how human competencies influence organizational agility is critical. This paper discusses the antecedent factor of information technology personnel competency toward organizational agility. Literature was reviewed and further examined upon two information systems theories, the dynamic capabilities view (DCV) and people capability model maturity (P-CMM). This study was conducted at Malaysia automotive organizations, auto A and auto B, with 151 participants. Data was collected and analyzed with SPSS and SmartPLS with the utilization of partial least square-structural equation modelling (PLS-SEM). The findings highlighted that human factor significantly influence how organizations respond to internal and external parties. These findings offer insights into empowering the IT workforce towards industrial revolution 4.0 (IR 4.0).

Corresponding Author:

Noor Hafizah Hassan
Faculty of Arts and Science, International University of Malaya-Wales
Kuala Lumpur, Malaysia
Email: noor.hafizah@iumw.edu.my

1. INTRODUCTION

As a developing country, Malaysia depends on the industrial sector for employment and as a source of income [1]. The industrial sector has evolved through time, and to this date, numerous developed countries like Japan and Germany successfully achieved industrial revolution (IR 4.0) and progressively toward (IR 5.0) [1] Agility is one organizational capability that is highly required in IR 4.0. The responsiveness or agility capability of organizations is critical to Malaysia automotives. This is because this sector provided business opportunities to micro, small, and medium enterprises (MSMEs) as well as the employment of medium and lower-level income citizens [1]–[3]. Various studies on information technology (IT) and agility discussed how IT enables agility. Yet many studies argued that IT may impede agility [1], [2]. Further investigation on how IT can enhance agility is critical in recent times. Information technology facilitates infrastructures for business operations [2]. However, studies on how human capabilities could aid in enhancing agility are highly needed to examine. Agility can be in many perspectives, namely organizational agility, and system agility [3]. Various studies focused on organizational agility to further understand the driving factors and their impacts [4]–[6]. This is vital to enhance the current performance that emphasizes on increase stakeholder engagement [5]. These organizations need to be more responsive to their external parties, i.e., customers and suppliers. They need to be internally responsive since this agility characteristic can help the organizations to improve their operational efficiencies and effectiveness [6]. Specifically, in Malaysia, the study to understand enabling factors of human IT capabilities is still lacking in numbers [7]. Several studies in automotive also found the scarcity of Malaysia

automotive (auto A and auto B) in their degree of organizational agility [8]. These studies' findings also highlighted the importance of the enhancement of human and IT infrastructures in enabling agility [9], [10].

This study aims to address the above issue and further examine the antecedent factors and consequently suggested initiatives that could be done for improvisation [10], [11]. The insights will facilitate the key initiatives that could be implemented by Malaysia automotive to their workforce. Could be further enforced for their car dealers, suppliers, and other stakeholders. This study also contributed new knowledge on human capital capabilities that could simultaneously increase the flexibility and agility that critically seek in IR 4.0 [12]–[14]. This study is significant as it highlights key initiatives that organizations could focus on to directly increase both human competency and organizational agility. The structure of this paper is as follows: section 1 explains about research background from various literature reviews, and relevant theoretical lenses to support the study. Section 2 describes the research methodology of the conducted empirical study. Section 3 discusses the research findings and managerial insights, and finally, section 5 concludes the paper and highlights future works.

Organizational agility is often known as "firm agility", "enterprise agility", "business agility" and "agile organization" [11]. Organizational agility is defined as the capability of an organization to be responsive to internal and external parties. This responsiveness can be in terms of timely sense, cost-effective, and enhanced flexibility [12]. This capability is vital to Malaysian organizations, especially automotive organizations. As providers of employment and business opportunities, Malaysia automotive organizations should be continuously agile to ensure they progressively evolve as a vital market player, parallel with rapid technology growth achieving IR 4.0 [12]. In the current situation, Malaysia automotive organizations should improve and take better initiatives to enhance agility [12]. The software, hardware and network, and people are undeniable essential factors. However, ensuring all these factors constantly become enablers and do not hinder organizational agility is challenging [13]. Information communication and technology are always viewed as an antecedent of agility [13]. However, previous studies highlighted that IT-enabled agility should not be taken lightly, as it may hinder agility. The organization should be able to continuously examine the utilization of its resources to reduce risk and threats from IT failures [12], [13].

Recent studies on IT capabilities explored various perspectives on infrastructure flexibility, employee agility, innovation roles, strategic flexibility, intellectual capital, and human capital [14]. This study intends to enrich information systems studies with findings that specifically focus on the IT workforce playing significant roles in enhancing organizational agility. Prior studies found several drivers for organization agility and categorized them into four categories: technological enablers, behavioral enablers, organizational and structural enablers, and environmental enablers. Technological enablers are summarized as IT resources (software, hardware, and network) that assist business processes. Behavioral enablers define as the capability of the organization to respond and sense. This capability explains the extent of strategy formulation and decision-making, as these drivers consist of human and cultural factors [14]. This human factor will be further discussed in the following part of this paper. Organizational and structural enablers refer to high-level issues concerning strategic orientation, business model selection, and environmental monitoring. They are quite similar to behavioral drivers but mainly in organization, structure, and governance. Finally, environmental enablers explain the drivers that deal with environmental factors such as speed of change [14], [15].

This study focuses on the human factor of IT-enabled agility that could be referred to as "IT personnel competency (ITPC)" or "IT human competency". ITPC explains the capability of humans in the organization to assist other members of the organization. To this date, most organizations in Malaysia utilize IT in their business [16]. Hence, the readiness of IT people is very critical. At this point, IT people not only could be prepared for all IT-related issues but could be better than qualified to assist and support technical and non-technical IT issues [16]. Prior studies suggested that the IT team could have readiness in three aspects like technological skills, management skills, and business skills [17]. Hence, for technological skills, IT people are expected to have some expertise according to their background and roles [16], [17]. Management skills required the IT team to have planning, organizing, assisting, leading, and coaching skills. These skills are important in managing their tasks efficiently and effectively. Business skills are critical to preparing them for any problem-solutions related to IT-related [16], [17]. Thus, this concludes that the requirements for IT people to only excel in IT technical skills are insufficient for modern days. They should learn management and technical skills to help other members [17].

Research findings by A and B stressed that Malaysia automotive organizations have yet to achieve fully skilled employees or to utilize more than 80% of knowledge workers. Towards IR 4.0, human capabilities need to be enhanced. The number of issues discovered from the customer's relation system can be concluded as follows:

- Responsive to customers' inquiries and feedback, especially in outlets and dealers.
- Responsive to suppliers' inquiries and issues.
- Responsive to internal changing processes.

With the literature reviews, this study formulates a research question, i.e., to what extent does ITPC drive organizational agility in Malaysia automotive organizations? In line with the research question, this study aims to achieve the research objectives; i) To investigate how ITPC drives organizational agility, ii) To validate the research framework that explains the driving factor of organizational agility, and iii) To propose IT and learning initiatives for Malaysia automotive organizations.

In this study, two theoretical models view as lenses. These two theories are relevant and in line with the research objectives and hypotheses. Dynamic capabilities view (DCV) is one well-known theory that is an extension of the resource based view (RBV) that explains how an organization should incorporate dynamic capabilities [18]. These dynamic capabilities include responsiveness, quick and flexible resources as well as monitoring of internal and external competencies [18]. DCV highlighted how organizations should have mixed capabilities that explain the integration of humans, technologies, and procedures. DCV stressed that these capabilities could not be static and should be constantly renewed and flexible [18]. DCV promoted how organizations should facilitate agile people, agile resources, and agile infrastructures [19]. DCV stressed the importance of flexibility capabilities which indicates the need for the IT workforce to perform toward organizational agility [19]. In this context, the IT team should enhance their abilities to respond, coordinate, and sense opportunities and threats, as well as how manage and control them, and learn and relearn.

Capability maturity model and integration (CMMI) is the second theory that is relevant to the context of this study. This theory proposed an efficient business model for an organization's software, and hardware [20]. Particularly in this paper, people capability maturity model (P-CMM), is studied to understand how people can drive organizational agility [20]. P-CMMI is a tool to address workforce issues in the organization. While CMMI is more towards software development, P-CMM focuses on facilitating human competencies, motivation, and performance. Although CMMI is similar to P-CMM in offering five maturity levels, the P-CMM model is a well-defined framework for constantly enhancing human capabilities. P-CMM is the roadmap that guides an organization in workforce development in skills, knowledge, and abilities. Constituent with competencies, P-CMM promotes the integration of knowledge, skills, and abilities with education and experiences. Each employee should constantly improve their competencies [20]. P-CMM applies to numerous industries, organization types, and sizes. P-CMM's five maturity levels comprise the initial level: maturity level 1, the managed level: maturity level 2, the defined level: maturity level 3, the predictable level: maturity level 4, and the optimizing level: maturity level 5. At the fundamental level of maturity (initial), the organization should revise the current working processes and improve on consistency. Studies found that common issues in organizations are the lack of consistent ways of performing work, lack of understanding of best ways of conducting work, rapid and uncontrolled requirements changes, and over-committed efforts. In the second stage of maturity (managed), organizations should develop a foundation applicable across the organization with a stable environment and advanced practice. Management should establish a stable environment since it can motivate employees and create a professional working environment. The third level of maturity (defined) is when organizations identify the best practices and turn to integrate them into daily tasks. These practices should be documented for constant review and analysis. Next, in level 4 of maturity (predictable), the performance is quantitatively analyzed, and corrective action will be taken for the necessary process. Finally, in the final stage (level 5-optimizing), organizations should constantly improve by analyzing all aspects of performance by investigating the risk. and challenges with continuous empowerment [20].

2. METHOD

Based on the theoretical study in the previous section, this research developed the hypothesis to examine the relationship between the IT human factor and organizational agility. The hypothesis developed was: "To what extent does IT personnel competency drives organizational agility?". Therefore, in the following section, this paper will describe the quantitative method used in this study since it is the most relevant method of selection due to the research domain, data types, respondents' category the group, and data analysis tools and techniques.

2.1. Data collection

The survey questionnaire was adopted and revised from validated items used in previous studies based on questionnaire development steps proposed by Brancanto *et al.* [21]. Multiple study items in similar research domains were used to determine the reflective construct items [21]. All identified items then went through for expert review before proceeding to data collection. The finalized questionnaire comprised four (4) (close-ended) demographic and, 13 questions on IT capabilities on five (5) points as in the Likert scale. All items went through multiple revisions and evaluations (expert review). It is one of the evaluation methods for the questionnaire, which can be done individually or in a group. This study has completed its expert review processes involving four (4) specialists in Human Resources and Information Technology to verify all survey

questions in terms of completeness, understandability, ambiguity, and terminology. The main data collection involved 151 participants from Malaysia automotive organization (auto A and auto B). The selection of participants was based on judgmental sampling due to the criteria applied. Participants should be employees that work in any department, any rank, or position that use Information Systems in their daily tasks. Data collected was later analyzed with IBM SPSS statistics and SmartPLS.

3. RESULTS AND DISCUSSION

Findings discussed in the following subsection presented the demographic descriptions as well as partial least square-structural equation model (PLS-SEM) results. Demographic descriptions presented participants' descriptions that were important to be reported for the research. Meanwhile, subsection 3.2 highlighted the statistic tool utilized in this research and displayed the outcome of IT human competency impact on organizational agility. The final subsection presented the measurement model and structural model results together with recommendations.

3.1. Demographic

Demographic questions were to enhance the researcher's understanding of population characteristics. The descriptive statistics described the rank/position, department, years in the current organization, and types of information systems they use in their daily tasks. Overall findings from the demographic study highlighted that the majority of participants were executives (52 participants/34%), followed by engineers (25 participants/16%) and technologists (22 participants/14%). They were grouped as employees who often used systems in performing their daily tasks. The majority of participants also worked in the IT department with 28 participants (19.0%), followed by 22 participants from sales and after sales (15.0%), 18 participants (12.0%) from manufacturing, and 15 participants (10.0%) from quality control. These departments were known as core operations in Malaysian automotive. Finally, in terms of years of service. Most of them have worked for about five to ten years in the current organization, and their capability to understand the core business and systems usage is sufficient and acceptable. The final question in the demographic section gathered data on the usage of information systems. The findings revealed that highly used systems were management information systems (MIS), office automation systems (OAS), and transaction processing systems (TPS).

3.2. Partial least square-structural equation model

This study used the PLS-SEM as an analysis technique for several reasons. Firstly, SEM is a powerful statistical technique that allows hypothesis testing with multivariate analysis [22]. Secondly, the PLS-SEM is suitable for exploratory studies with reflective items with a minimum sample size which is undera 200 samples [22]. Therefore, the collected data were analyzed according to the two measurement models involved in PLS-SEM, i.e., the reflective measurement model and the structural measurement model.

3.3. Discussion of the findings

The findings from the measurement model and structural model are summarized in Table 1. The empirical result showed an ITPC path coefficient of 0.339 and a t-value of 3.116. It is followed by a 0.355 lower bound value and 0.074 upper bound value with a difference of 0.281. Based upon a 5% significance level, the relationship between ITPC and OA is significant.

Table 1. Assessment of structural model

Tested path	Path coefficient	Standard error	T-value	P-value	f2	Decision
ITPC→OA	0.339	0.109	3.116	0.001***	0.149	Supported

p<0.1 (Significance level of 10%); **p<0.05 (Significance level of 5%); ***p<0.01 (Significance level of 1%)

There are several initiatives proposed in this study. These initiatives can be implemented by Malaysia automotive organizations and other organizations across any industry. Based on the findings on each construct item. Malaysia automotive organizations revealed that to be lacking in a few key areas. These include ITPC1 and ITPC5, which referred to 'IT personnel is free to assist' and 'IT personnel are trained in various IT methodologies and tools. Therefore, this study suggested that the IT workforce required help in several aspects. They should always be well prepared to help other members of the organization. The top management can enhance their skills in problem-solving, decision-making, responsiveness, and capability to manage their time and find solutions [23]. The suggestions are as follows:

- Constantly improve employee theoretical and practical skills.
- Offer personnel agility: active knowledge sharing, lesson learned, mistakes tolerance, job self-efficacy, job transparency and integrity, and job-related curiosity.
- Continuously encourage employee's motivation to develop and share new ideas.

Organization embeds employees' knowledge in organizational procedures, structures, and systems [24]. Nevertheless, this study also proposes that IT personnel should be able to perform or has the following capabilities [25]:

- Free to assist and very capable of teaching others.
- Ability to work closely with clients and customers.
- Quickly find technical solutions.
- Trained in a variety of IT methodologies and tools.

4. CONCLUSION

Organizational agility is vital for Malaysia automotive organizations, and people play the most crucial part in achieving it. Numerous initiatives should incorporate various strategies. Those initiatives can transform the workforce into knowledgeable and skillful talents. Promoting agility within the organization requires reanalyzing and revising many aspects of human resources. In this pandemic and endemic era, Malaysian automotive organizations should further explore digital transformation to understand the key competencies that are highly needed in their human assets. Selection of the right training theoretically and practically for the right personnel and team is crucial. Minimizing risks and threats towards IR 4.0 can be part of short-term and long-term goals. However, this study has its limitation. Hence, future research should improve in terms of types of research, data types, and method of analysis. Future works should compare auto A and auto B and investigate local vehicle dealers longitudinally to understand organizational performance over time.

REFERENCES

[1] M. S. R. A. Hamid, N. R. Masrom, and N. A. B. Mazlan, "The key factors of the industrial revolution 4.0 in the Malaysian smart manufacturing context," *International Journal of Asian Business and Information Management*, vol. 13, no. 2, pp. 1–19, Jun. 2022, doi: 10.4018/IJABIM.20220701.oa6.

[2] H. E. Cho, I. Jeong, E. Kim, and J. Cho, "Achieving superior performance in international markets: the roles of organizational agility and absorptive capacity," *Journal of Business and Industrial Marketing*, vol. 38, no. 4, pp. 736–750, Feb. 2023, doi: 10.1108/JBIM-09-2021-0425.

[3] B. Mrugalska and J. Ahmed, "Organizational agility in industry 4.0: A systematic literature review," *Sustainability (Switzerland)*, vol. 13, no. 15, p. 8272, Jul. 2021, doi: 10.3390/su13158272.

[4] K. Werder and J. Richter, "A meta-analysis on the effects of IT capability toward agility and performance: New directions for information systems research," *PLoS ONE*, vol. 17, no. 10 October, p. e0268761, Oct. 2022, doi: 10.1371/journal.pone.0268761.

[5] J. Lee and J. H. Song, "Developing a measurement of employee learning agility," *European Journal of Training and Development*, vol. 46, no. 5–6, pp. 450–467, May 2022, doi: 10.1108/EJTD-01-2021-0018.

[6] I. W. E. Arsawan, N. K. D. Hariyanti, I. M. A. D. S. Atmaja, D. Suhartanto, and V. Koval, "Developing organizational agility in SMEs: an investigation of innovation's roles and strategic flexibility," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 8, no. 3, p. 149, Sep. 2022, doi: 10.3390/joitmc8030149.

[7] U. A. Muazu and S. Abdulmalik, "Information technology capabilities and competitive advantage: a review," *International Journal of Technology and Systems*, vol. 6, no. 1, pp. 1–17, Jan. 2021, doi: 10.47604/ijts.1206.

[8] N. H. Hassan, "The role of it infrastructure flexibility and learning orientation towards organisational agility," Doctoral dissertation, Universiti Teknologi PETRONAS, Malaysia, 2020.

[9] M. Christofi, V. Pereira, D. Vrontis, S. Tarba, and A. Thrassou, "Agility and flexibility in international business research: a comprehensive review and future research directions," *Journal of World Business*, vol. 56, no. 3, p. 101194, Apr. 2021, doi: 10.1016/j.jwb.2021.101194.

[10] A. Ahmed, S. H. Bhatti, I. Gölgeci, and A. Arslan, "Digital platform capability and organizational agility of emerging market manufacturing SMEs: the mediating role of intellectual capital and the moderating role of environmental dynamism," *Technological Forecasting and Social Change*, vol. 177, p. 121513, Apr. 2022, doi: 10.1016/j.techfore.2022.121513.

[11] P. P. Tallon, M. Queiroz, T. Coltman, and R. Sharma, "Information technology and the search for organizational agility: A systematic review with future research possibilities," *Journal of Strategic Information Systems*, vol. 28, no. 2, pp. 218–237, Jun. 2019, doi: 10.1016/j.jsis.2018.12.002.

[12] A. S. Awwad, O. M. A. Ababneh, and M. Karasneh, "The mediating impact of it capabilities on the association between dynamic capabilities and organizational agility: the case of the jordanian IT sector," *Global Journal of Flexible Systems Management*, vol. 23, no. 3, pp. 315–330, Sep. 2022, doi: 10.1007/s40171-022-00303-2.

[13] S. A. Haider, J. M. Martins, S. Khan, M. N. Mata, S. Tehseen, and A. Abreu, "A literature review on agility- is there a need to develop a new instrument?," *Academy of Accounting and Financial Studies Journal*, vol. 25, no. 4, pp. 1–14, 2021.

[14] N. Anwar, M. N. Masrek, and M. K. J. A. Sani, "A systematic review on the strategic utilization of information systems and IT infrastructure flexibility," *Communications of the IBIMA*, pp. 1–13, Feb. 2017, doi: 10.5171/2017.518818.

[15] A. S. George and A. S. H. George, "Industrial revolution 5.0: the transformation of the modern manufacturing process to enable man and machine to work hand in hand," *Journal of Seybold Report*, vol. 15, no. 9, pp. 214–234, 2020.

[16] G. Li, "Research on the relationships between knowledge-based dynamic capabilities, organizational agility, and firm performance," *Journal of Risk and Financial Management*, vol. 15, no. 12, p. 606, Dec. 2022, doi: 10.3390/jrfm15120606.

[17] J. Reardon, R. Hasty, and B. Coe, "The effect of information technology on productivity in retailing," *Journal of Retailing*, vol. 72, no. 4, pp. 445–461, 1996, doi: 10.1016/S0022-4359(96)90023-8.

[18] D. M. Steininger, P. Mikalef, A. Pateli, and A. Ortiz-De-guinea, "Dynamic capabilities in information systems research: a critical review, synthesis of current knowledge, and recommendations for future research," *Journal of the Association for Information Systems*, vol. 23, no. 2, pp. 447–490, Mar. 2022, doi: 10.17705/1jais.00736.

[19] X. Qiu, E. Holmen, M. Havenvid, L. D. Boer, and F. Hermundsdottir, "Open for business: towards an interactive view on dynamic capabilities," *Industrial Marketing Management*, vol. 107, pp. 148–160, Nov. 2022, doi: 10.1016/j.indmarman.2022.09.027.
[20] E. Gökalp and V. Martinez, "Digital transformation capability maturity model enabling the assessment of industrial manufacturers," *Computers in Industry*, vol. 132, p. 103522, Nov. 2021, doi: 10.1016/j.compind.2021.103522.
[21] G. Brancato *et al.*, "Handbook of recommended practices for questionnaire development and testing in the European statistical system," *European Commission Grat Agreement*, p. 142, 2006, [Online]. Available: http://epp.eurostat.ec.europaipv6.eu/portal/page/portal/research_methodology/documents/Handbook_questionnaire_development_2006.pdf.
[22] M. Sarstedt, L. Radomir, O. I. Moisescu, and C. M. Ringle, "Latent class analysis in PLS-SEM: a review and recommendations for future applications," *Journal of Business Research*, vol. 138, pp. 398–407, Jan. 2022, doi: 10.1016/j.jbusres.2021.08.051.
[23] D. M. Marchiori, R. G. Rodrigues, S. Popadiuk, and E. W. Mainardes, "The relationship between human capital, information technology capability, innovativeness and organizational performance: An integrated approach," *Technological Forecasting and Social Change*, vol. 177, p. 121526, Apr. 2022, doi: 10.1016/j.techfore.2022.121526.
[24] H. Dzwigol, M. Dzwigol-Barosz, R. Miskiewicz, and A. Kwilinski, "Manager competency assessment model in the conditions of industry 4.0," *Entrepreneurship and Sustainability Issues*, vol. 7, no. 4, pp. 2630–2644, Jun. 2020, doi: 10.9770/jesi.2020.7.4(5).
[25] H. Lai, A. H. Pitafi, N. Hasany, and T. Islam, "Enhancing employee agility through information technology competency: an empirical study of China," *SAGE Open*, vol. 11, no. 2, p. 215824402110066, Apr. 2021, doi: 10.1177/21582440211006687.

BIOGRAPHIES OF AUTHORS

Noor Hafizah Hassan is a senior lecturer at the International University Malaya-Wales (IUMW) at the Faculty of Arts and Science. She received her Ph.D. in the area of information technology specializing in information Systems from the Universiti Teknologi PETRONAS (UTP). Her research interest is information systems and project management. one of her achievements is the best research paper award at the international conference on research and innovation in information systems (ICRIIS). She is a member of the Malaysia association for information systems (MyAIS) and persatuan industri komputer dan multimedia Malaysia (PIKOM). She can be contacted at email: noor.hafizah@iumw.edu.my.

Noreen Izza Arshad is currently an associate professor with the Universiti Teknologi PETRONAS, Malaysia. As a department of computer and information sciences member, she teaches and conducts research as part of the positive computing research center, institute of autonomous systems. She has designed some methodologies, frameworks, tools, and technologies for assisting society, that include robotics intervention, stuttering mobile applications, elderly monitoring systems, and content management systems for organizations among others. She can be contacted at email: noreenizza@utp.edu.my.