THE CHALLENGES OF EMERGING TECHNOLOGIES: THE EXPERIENCE OF PROCUREMENT PROFESSIONALS

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ABSTRACT
This empirical research was conducted based on qualitative transcendental phenomenological approach. The in-depth interviews were conducted with 15 procurement professionals located in Malaysia. The emerging technologies related to procurement include electronic procurement, Internet of Things, big data analytics, artificial intelligence, and 3D printing. These emerging technologies potentially enabling procurement professionals to be relevant, effective and efficient in their working activities. However, procurement professionals experience many challenges of adopting these emerging procurement technologies. This research revealed six challenges of emerging technologies as experienced by procurement managers. First, talent management is very crucial for adoption of emerging technologies. Second, difficulty to prioritize and integrate different types of emerging technologies. Third, lack of electronic data interchange to achieve full implementation of e-procurement. Fourth, data security and data quality of emerging technologies. Fifth, top management and headquarters are required for adoption of emerging technologies. Sixth, lack of financial justification to adopt emerging technologies.

Keywords: Artificial intelligence, e-procurement, big data, blockchain, Internet of things,3D pronting

1. INTRODUCTION

Emerging technologies enabled procurement professionals to focus on strategic decision making and activities. Technologies also enabled procurement to extend the strategic role of collecting, analyzing and processing big data in order to support efficiency, effectiveness and profitability (Bienhaus & Haddud, 2018). Other than these, emerging technologies in procurement also reduce coordination cost and wastes (Glas & Kleemann, 2016). Emerging technologies are so useful and beneficial but procurement professionals' experiences are still in the infancy stage. Hence, it is crucial to investigate the challenges for procurement professionals to adopt these emerging technologies.

E-procurement has been available for the past 20 years though it is still not fully implemented for some procurement activities. E-procurement enables the transactions and processes of procurement to be conducted and connected electronically without any hard copy documents. E-procurement includes electronic sourcing, electronic quotations, electronic contracts, electronic purchase orders, electronic invoicing and electronic payment. The software of enterprise resource planning (ERP) and electronic data interchange (EDI) are crucial to facilitate e-procurement. E-procurement has proven to be beneficial for multinationals companies in Malaysia.

It reduces purchasing cycles and cost significantly. However, not many multinational companies in Malaysia have fully implemented e-procurement. It means they just implement partial e- procurement or basic e-procurement. For example some of them still emailed suppliers the scanned purchase orders instead of electronic transmission of purchase orders (Loo & Seow, 2018). In addition, a study of agro-based SMEs in Malaysia showed that only 50% of them implemented e- procurement, less than 47% used web-based ERP and only 30% of them used web-based EDI (Kamarulzaman & Mohamed, 2013). Due to these, many procurement professionals have not experienced the full benefits of e-procurement. However, there is lack of research pertaining to the challenges of not fully implementing e-procurement.

Internet of things (IoT) refers to the billions of physical devices that are connected to the Internet. IoT provides real time visibility on the purchased material consumption quantities and how they are used. This is very helpful for procurement to improve catalogue content and spend management. IoT contributes to flexibility, productivity and efficiency of procurement. It is because all the purchasing transactions and information could be connected in the mobile technologies (Matters, 2015). For example, vending machine sends replenishment request to procurement professionals. RFID and GPS sensors to track product from store to floor, which gives real time temperatures of the cargoes from suppliers. Trucks drivers to be connected quickly pertaining to the location of cargoes ready for shipment. Procurement workflows to be mobile and connected everywhere (Nitesh, 2019). A conceptual paper projected that internet of things (IoT) could increase efficiency and effective in procurement as contributed from machine-to-machine communication and analytical software tools, without human interferences (Osmonbekov & Johnston, 2018). Nevertheless, the above-mentioned literatures are not empirical research and there is lack of research finding in Malaysia context with regard to IoT in procurement.

Artificial intelligence (AI) is the simulation of human intelligence processes by machines. AI learns from big data and user interface in order to serve users actively or passively. It serves actively by using predictive analytics to provide users with push notifications or options. It serves passively by receiving command from users to perform transactions (Ng, 2019). Current AI trends is automation of specific job functions rather than replacing purchasing professionals. Al performs forecast of purchase price, generate supplier contract template and preliminary supplier evaluation. Data analytics could be useful to predict supplier quality and risk management. Advance and intelligent data analytics is helpful for supplier negotiation (Zagorin, 2019). AI was proven to be useful for procurement professionals. Unfortunately, there are only 26% of organizations in Malaysia have embarked on AI journeys though more than 60% of them agreed that it would help to improve their job by reducing repetitive tasks. Hence, Malaysia is not ready for AI at this moment (Asia, 2019). Therefore, there is research gap to study the challenges of not adopting AI in procurement.

A blockchain is a network of computers that must all approve a transaction before it can be verified and recorded. Blockchain contributed to a streamlined business to procurement because it is a secure log of transactions and value exchanges. It streamlined payment to suppliers by removing intermediaries and by being fully digitalized. It connected suppliers to a decentralized network and allowed direct exchange of documents. Blockchain also increased transparency by storing and recording all transactions and ownership exchanges with suppliers (Maltaverne, 2017). However, blockchain is very new in Malaysia and thus very few SME companies have implemented it though there are initiatives to do so. Large companies in Malaysia might have sandboxed and piloted the

blockchain but it remains as conceptual stage as well. This further delay the implementation of blockchain for SMEs (Wong, Leong, Hew, Tan, & Ooi, 2019). The first transaction of blockchain in Malaysia was pioneered by HSBC bank on Oct 4th 2019. It was a letter of credit for the import of resin from Singapore by a Malaysian company (Star, 2019). As such, further empirical is required for challenges of adopting blockchain.

2. LITERATURE REVIEW

This section starts with the review of literatures on emerging technologies, their contributions to procurement professionals and then followed by the challenges of adopting them.

2.1 Emerging Technologies for Procurement professionals

The six emerging technologies covered in this research are electronic procurement (e-procurement), internet of things (IoT), big data analytics, artificial intelligence (AI), 3D printings and blockchain. Each of these emerging technologies are reviewed in the following paragraphs.

E-procurement could be provided by network service company and users could access system through usernames and passwords (Stephens & Valverde, 2013). For construction industry in Malaysia, the main factor affected the usage of e-procurement was the intention of using it (Mohd Daud, Mohammad, Azmi, & Mohamed, 2013). However, a study of Telekom Malaysia Berhad, a telecommunications company of Malaysia found that factors for the success of e-procurement among were supply chain integration, information sharing and supplier relationships (Rosli & Songip, 2017). Other than factors for adopting e-procurement in Malaysia, there is lack of research pertaining to the challenges of adopting e-procurement.

Big data means the data is big in volume, velocity, variety, veracity, value and variability. Big data enabled identification of risks associated to supply market and specific suppliers. Big data provides useful information for better sourcing of suppliers. It reveals unknown interrelations of suppliers and economics data (Sauter, 2014). A large number of potential suppliers from big data and improvement of analytical tools contributes to less supplier failures. The structured form of big data could be useful for the purpose of reporting or prediction in strategic sourcing activities. The unstructured form of big data could be useful for the purpose of reporting or prediction in supplier selection, supplier performance monitoring and risk management. However, only big data with predictive purpose was useful for planning and forecasting in procurement. Big data is useful for procurement in terms of improvement in delivery time, cost, flexibility, quality and sustainability (Moretto, Ronchi, & Patrucco, 2017). Big data reduces incoming transportations which subsequently reduced purchasing costs (Klünder, Dörseln, & Steven, 2019). Big data is proven to be very useful for procurement professionals but there is lack of research conducted in Malaysia.

In relation of AI, cognitive procurement is a method of using disruptive technology to support procurement management. It is utilises self-learning technologies for data processing in sourcing and buying of procurement function. However, cognitive procurement is more than data or AI, it is the synergies from many parts of business system, it includes automation, big data, master data management, advance analytics & algorithms, machine learning, artificial intelligence and natural language processing. For machine learning, algorithms learns the user pattern after several transactions and then serve as a personal assistant to user (Ng, 2019).

Three-dimensional (3D) printing build parts layer by layer based on 3D CAD (computer aided design) without any mold, tool or fixture. It shortens the lead time for production and shipping which contributed to cost saving. It is suitable for items with many varieties and short term stockouts (Song & Zhang, 2018). However, there is lack of research pertaining to the adoption of 3D printing in Malaysia.

Blockchain could integrate and supplement the current ERP software. Blockchain synchronize all data and transaction across the network, Once the goods are moved from suppliers to in-transit, block chain enables transactions to be updated in real time for everyone and everywhere. Based on constantly refreshed ledger, blockchain enables effective price negotiation because it could calculate the exact volume discount based on total purchased quantity from all business partners while maintaining their privacy (Brody, 2017).

2.2 Challenges of Procurement Technologies

Numerous skills and capabilities were required in Procurement technologies (Glas & Kleemann, 2016). However, most of the procurement technologies are in conceptual stage of development. The technology awareness is still insufficient. There is resistance to change and reluctance to shift away from the existing systems (Rejeb, Sűle, & G Keogh, 2018). There were challenges due to barriers of existing procedures, processes, capacities and capabilities (Bienhaus & Haddud, 2018) . There is a need to constantly update the technologies and methodologies for data analytics (G. Wang, Gunasekaran, Ngai, & Papadopoulos, 2016). In Malaysia, there is lack of activities to engage suppliers in Industry 4.0, which required emerging procurement technologies (Rajagopal, Tan, & Loo, 2018). Other than the overall challenges of procurement technologies, the challenges of each technology will be reviewed in the following paragraphs.

The challenges of e-procurement included employee resistance of change, lack of management support and existence old IT equipment (Amemba, Nyaboke, Osoro, & Mburu, 2013). The challenges of procurement technologies were more related to information technologies rather than procurement issues. Procurement professionals were doubtful of procurement technologies due to high investment costs, high expectations, transparency, security and data ownership (Glas & Kleemann, 2016). The shared database architecture of service providers is high risk for different companies which used the same service. The service provider might not create different databases for different companies. Most users were not sure about the escalation procedures of security breaches and the importance of keeping the password secured (Glas & Kleemann, 2016). Moreover, there was challenges of no direct connection or integration between service provider and the users' organization network. (Stephens & Valverde, 2013). There were challenges of transferring process due to data security issues and the capacity of long distance wireless networks (Szozda, 2017). Besides security, information challenges of e-procurement included the concerns with regard to confidentiality and privacy of information exchange (Abu-ELSamen, Chakraborty, & Warren, 2010). In addition, there was a problem of 'data silos', when data only usable by a single department and functional cross-referencing was not workable (Zagorin, 2019).

In Malaysia, there were 30,000 government suppliers encountered many challenges of incomplete infrastructure to access e-government system. The challenges of e-procurement included lack of commitment form top management, incompatible software packages, time consuming to design in-house systems, financial constraints, security issues, lack of standards in system development and insufficient broadband coverage (Nawi, Roslan, Salleh, Zulhumadi, & Harun, 2016). In addition, there were challenges of system specification and implementation management in e-procurement of Malaysian government sector. System specification challenges included software integration, data management, IT infrastructure, legal and administration procedures. Challenges of implementation management were related to outsourcing and IT skills (Aman & Kasimin, 2011). Even for private company suppliers, they had yet to implement the full e- procurement, for example, scanned copies of purchase orders were e-mailed to suppliers instead of direct electronic order transmissions using electronic data Interchange (Loo & Seow, 2018). This motivates further research to study the challenges of not fully adopting e-procurement.

AI may make independent decisions which raises the concerns of over control, accountability and trust. It is high cost to obtain the data and train the machine (Ng, 2019). For business leaders who adopted AI in Malaysia, they encounter challenges of lack of leadership, skills and tools (Asia, 2019). The challenges of cognitive procurement, which related to AI include limited data availability, bad quality data, lack of standardized procurement processes, lack of talent, limitations of change management, lack of robust solutions on legacy systems and lack of credible references (Pai, 2019). However, there is still lack of research to study the adoption of AI for procurement professionals in Malaysia.

For blockchain, it poses challenge of scalability because every node needs to process and validate every transaction, and thus it requires enormous computing power and high bandwidth internet connection (Banerjee, 2018; Min, 2019). Another challenge is related to government regulation and restriction to control the blockchain implementation (Banerjee, 2018; Hackius & Petersen, 2017; Min, 2019). Other challenges of blockchain could be lack of expertise and organizational resistance (Min, 2019). In addition, there are challenges of data security, lack of technological maturity, lack of industry acceptance and unclear benefits (Hackius & Petersen, 2017). The absence of intermediary in blockchain could create uncertainty among the supply chain partners (Y. Wang, Han, & Beynon-Davies, 2019). In addition, there are challenges privacy and data protection (Clauson, Breeden, Davidson, & Mackey, 2018; Y. Wang et al., 2019).

Pertaining to block in Malaysia context, the existing regulatory framework provide some protection and security but the regulation that address cryptocurrencies has yet to be issued. The central bank of Malaysia does not regulate the digital currency exchanges and digital currency is not recognized as legal tender (Zakaria, Kunhibawa, & Munir, 2018). Privacy is the most significant barrier for the adoption of blockchain in Malaysia. Other barriers include security, stability and difficulties in switching to a new technology (Ku-Mahamud, Bakar, & Omar, 2018).There is a challenge in Malaysia is to have a regulatory framework of blockchain that satisfies both productive innovation and public security (Yussof & Al-Harthy, 2018). A study of Malaysian SMEs found that complexity is a significant challenge for adoption of blockchain, which included process efficiency, usage and system functionality (Wong et al., 2019). However, the research did not focus on procurement professionals because only 10% of participants worked in procurement function.

There are not many researches related to the challenges of big data, IoT and 3D printing. Big data poses the challenges of data quality, limited senior stakeholder endorsement, lack of data integration, availability of analytic resource, low level of awareness and lack of skills to deliver solutions (Deloitte, 2017). Procurement professionals are required to have technical knowledge, intellectual curiosity and business acumen in order to analyse the big data (Bag, 2016). Internet of things poses the security and privacy concerns due to the increased of machine-to-machine communications (Osmonbekov & Johnston, 2018). 3D printing posed unanswered questions on intellectual property rights. Buying and selling the right to use a design need to be considered (Wilson, 2015).

The above literature reviews concluded that there is research gap to study the challenges of adopting emerging technologies as experienced by procurement professionals.

3. METHODOLOGY

This research adopted qualitative transcendental phenomenological approach from Moustakas (Moustakas, 1994). In-depth interviews were conducted for 15 procurement professionals selected from purposive sampling. The data was analysed with van Kaam method modified by Moustakas (1994).

3.1 The Method

This qualitative transcendental phenomenological research used semi-structured, audio recorded and transcribed interviews to examine purchasing professionals' lived experiences pertaining to challenges of emerging technologies. This research is conducted in qualitative approach because it is a new topic in Malaysia context, and not much known about this. Qualitative methodology is most suitable to explore the complete detail of this new topic by directly interacting with participants, and allowing them to share their stories. This research chooses Phenomenology because it is the most suitable method compared with other qualitative methods. There are four processes in phenomenological research which consists of epoche, phenomenological reduction, imaginative variation and synthesis (Moustakas, 1994). All these four processes were applied in this research. The first process of 'epoche' was used as mentioned by Moustakas (1994) to ensure the researcher was completely open, receptive and naïve in listening to research participants' description. It means refrain from judgment and abstain from ordinary way of perceiving things. The second process is phenomenological reduction, which called for suspension of judgment as to the existence or nonexistence of an experience's content. The third process of imaginative variation is ─to seek possible meaning through the utilisation of imagination, varying the frames of reference, employing polarities and reversals, and approaching the phenomenon from divergent perspectives, different positions, roles, or functions (Moustakas, 1994, pp. 97-98). The last step is synthesis of meanings and essences, it is the intuitive integration of the fundamental textural and structural descriptions into a unified statement of the essences of the experience of the whole phenomenon (Moustakas, 1994).

3.2 Research question

The data was collected from participants by using open-ended questions. Main research question guiding this study was "What is the experience of procurement professionals with regard to the challenges of adopting emerging technologies?"

3.3 Sample

The population of this research came from purchasing professionals working in various industries. Purposive sampling was conducted in this research to select procurement professionals with the basic experience of e-procurement and other emerging technologies. Purposive sampling was chosen because not many procurement professionals in Malaysia could fit in this new research topic. A total of 15 participants were selected from companies located in Malaysia but the participants should have at least 5 years working experience as procurement professionals. There were 9 participants worked in multinationals companies and 6 participants worked in small and medium enterprises (SME).

3.4 Data Collection and Analysis

The data was collected with phenomenological interviewing, which is a specific type of in-depth interview. The data was collected in six months period from January until June 2019. Each in- depth interview lasted about 45 minutes.

The data analysis in this qualitative phenomenological research used Moustakas (1994)'s modification of the van Kaam method. Data analysis was conducted throughout the research process and it was completed three months after data collection was completed. The audio taped interviews were transcribed verbatim. The participants were asked to verify the transcripts. Each transcript was imported into Nvivo 10 software and significant statements in every transcript were extracted. The Nvivo 10 was used to arrange, classify and analyse the transcription. The researcher verified each response as soon as possible after the interview to avoid changes of the perception due to time

passage. The significant statements were identified and formulated into invariant constituents and then into themes, which provided complete description of experiences.

After the interviewing and transcription were completed, the research used the following seven steps to analyse the data (Moustakas, 1994, p. 120): listing and preliminary grouping; reduction and elimination; clustering and thematising the invariant constituents; final identification of the invariant constituents and themes; constructing individual textural description for each participant based on the relevant validated invariant constituents and themes; constructing for each participant an individual structural description based on textural description and imaginative variation; and constructing for every participant a textural-structural description of the meanings and essences of the experience. From the individual textural-structural description, this research developed a composite description of the meaning and essences of the experience, representing the group as a whole.

4. FINDINGS
4.1 Talent Management Is a Challenge

It was a challenge to recruit the talent to interpret and communicate the meaning of big data. For example, AI required rigorous processes of cleansing, analyzing and acting on big data. It depends heavily on algorithm and predictive. The current procurement professionals lack of talent in data science. MBA holders and business degree students did not have the necessary knowledge to interpret the data. They know about the emerging technologies but they did not have in-depth knowledge to adopt or implement them. However, the data scientists did not have enough procurement knowledge. Hence, there were both challenges to train data scientists with procurement processes or to train current procurement professionals with the knowledge of data science. Data scientists did not have interest to specialize in procurement function. Procurement professionals were business degree students who found data science and emerging technologies to be difficult. In addition, high turnover of procurement professionals posed another challenge to talent training. The reason being e-procurement software could be custom made, hence trainings and learning curve were required for new hires. These findings were in line with the previous research which mentioned that numerous skills and capabilities were required in procurement technologies (Glas & Kleemann, 2016). However, this research adds value by specifying that there is challenge of equipping procurement professionals with knowledge of data science.

There were talent issues encountered by procurement professionals and their suppliers. They lack of knowledge and experience to identify the right tools to collaborate with suppliers. These issues further slowdown the adoption processes of emerging technologies. This finding is related to previous research (Rajagopal et al, 2018), which mentioned that there was lack of activity to engage suppliers in emerging technologies of Industry 4.0.

Software technology vendors lack of procurement knowledge to architect the right and effective solution to boost front end or backend procurement processes in aligning to business strategy. This made the adoption of emerging technologies became not relevant to procurement professionals. These findings were in line with the research findings of Deloitte (2017) which mentioned about the low level of awareness and lack of skills to deliver solutions.

4.2 Slow to Prioritize and Integrate the Emerging Technologies

Procurement professionals faced difficulty to clearly define the vision, strategy and objectives of prioritising emerging technologies. Hence, they did not know where or how to prioritize or integrate the selection of emerging technologies. For example, they were not sure which technology to prioritize, for example IoT, big data analytics, blockchain or artificial intelligence. In addition, they did not know which type of hardware or software to invest as the priority. For example, should they

prioritise the ERP software, RFID software or electronic data interchange. This leads to a lengthy and ongoing discussions without any tangible action plan. Thus, procurement professionals are slow to adopt any emerging technologies. The adoption of technologies is still in the very early stage. This is consistent with the research finding of Rejeb et al (2018).

Even for e-procurement, procurement professional found it difficult to decide whether they should integrate the full ERP for electronic purchase orders, electronic contracting, electronic quotation request, electronic tendering, electronic bidding or electronic invoicing from suppliers.

In term of blockchain, the companies lack ERP, EDI or RFID tools within their existing systems. The companies still operated rigid systems that did not support blockchain technology. In fact, procurement professionals were not ready to adopt blockchain. They were required to master the basic technologies of ERP, EDI, RFID and e-procurement before proceed to the latest technologies. The finding of slow to integrate the different types of emerging technologies is quite a new finding which not mentioned by previous research.

4.3 Lack of Electronic Data Interchange to facilitate e-procurement

Procurement professionals encountered the challenges of not using EDI to directly transmit e-purchase orders and e-request for quotation (E-RFQ) to suppliers. In the similar way, there was lack of EDI adoption for suppliers to directly transmit electronic quotations and electronic invoices to customers. Due to the absence of EDI, procurement professionals used a supplier portal for suppliers to retrieve RFQs and purchase orders. In the similar way, suppliers uploaded their quotations and invoices in pdf format to the supplier portal. In the worse scenario of not having supplier portals, pdf invoices and purchase orders were attached by emails instead of using supplier portals. However, either supplier portals or attachment of pdf file by emails, the suppliers still need to enter purchase orders in their own system. Procurement professionals' receiving department still required to perform data entry from the pdf invoices. Hence, supplier portals and emailing of pdf did not solve the problem of data entry redundancy. Based in the current rate of progress, it might take many years for the full adoption of e-procurement by EDI. These findings were quiet similar with the previous researches in Malaysia (Loo & Seow, 2018; Rajagopal et al, 2018).

It was another challenge to implement electronic supplier contract and electronic tendering because both procurement professionals and their suppliers found it more comfortable with hard copy contracts which could be signed and filed manually. This finding was not commonly stated in the previous research.

4.4 Security Issues of Emerging Technologies

Due to security issues many companies did not want to stay connected by Internet with their suppliers. They were afraid of too much confidential data to be exposed to suppliers. They still not sure how much data they supposed to share with their suppliers. This especially happened in many highly sensitive industries such as military or medical industries. Due to this security concern, EDI was not used for transmission of purchase orders and invoices. Purchasing professionals just e- mailed scanned copies of purchase order to suppliers. This finding is similar to the previous research of Abu-ELSamen et al. (2010) and Glas and Kleemann (2016) with regard to security issue.

Due to security and legal issues on digital assets, many technologies are still in a very early stage of experiments. For instance, blockchain, IoT and artificial intelligence. Especially for artificial intelligence, procurement professionals felt insecure to let the machine makes the decision for supplier selection and price approval. This is in line with the research finding of Osmonbekov and Johnston (2018). For big data which is related to data analytics and artificial intelligence, there are challenges of data quantity and quality. This is especially true when data is not available to be to be

connected and collected by RFID or IoT. It was also forecasted it may take another 5 years for blockchain to be implemented widely in Malaysia because security concern. This finding is quite unique for Malaysia context.

4.5 Lack of top management and headquarters support

Procurement role was still in the back room of companies. Procurement department was not perceived as a very strategic or important department. Top management paid more attention to other strategic departments such as operations or customer services. Procurement professionals required top management to support them with more resources such as manpower and finance to implement emerging technologies for long-term benefits. In contrary, top management expected procurement professionals to focus on short-term material supply and cost reduction. In fact top management did not see the immediate or long-term benefits of adopting emerging technologies. Top management did not understand or embrace the emerging technology and thus they did not see the value of supporting and encouraging procurement professionals in these technologies. This finding is in line with the previous research in Malaysia (Nawi et al, 2016).

This research discovered a new finding that procurement professionals who worked in multinational companies did not get direction or motivation from overseas headquarter to invest or adopt emerging technologies. It is because they reported directly to the headquarter procurement offices and thus they would not adopt emerging technologies if there is no direction from headquarters.

4.6 Financial Issue

Financial constraint for companies to invest on emerging technologies was a real challenge for procurement professionals. This financial constraint was very significant for small and medium companies. For multinational companies, they did not find the urgency to invest on emerging technologies for procurement. In fact they found it cheaper to hire more staff rather than to invest on emerging technologies to increase efficiency. Hence, they would rather channel their financial resources to other crucial or important areas such as factory expansion or factory automation. The return on investment of emerging technologies was perceived to be slow. For example, procurement professional still did not require their suppliers to implement RFID tags because it is still costly. For 3D printing, it is still not cost efficient for most products as compared with mass production.

The recent global economic instability and trade wars made it difficult for companies to get resources for investing in emerging technologies. In addition, companies restructured and downsized their operations made it even more challenging to focus resources on emerging technologies. Furthermore, it was difficult for companies to get government grants or incentives due to the recent shrinking of public budgets.

The abovementioned research findings are summarized in the following Table 1:

Table 1: Challenges of emerging technologies as experienced by procurement professionals

Challenges	Details
Talent Management for emerging technologies	Procurement Professionals lack of knowledge in data science
	Data scientist lack of knowledge in procurement
	Software technology vendor lack of knowledge in procurement
	Lack of technological leadership from multinational customers
	Procurement professionals lack of tools to engage with suppliers

Slow to prioritize and integrate emerging technologies	Difficulty to select the type of emerging technology to prioritize, IoT, big data, 3D printing, blockchain or artificial intelligence
	Difficulty to select hardware and software for emerging technologies, such as RFID infrastructure, ERP software or electronic data Interchange
	Difficulty to prioritize the components of e-procurement, such as e-purchase orders, e-quotation or e-invoicing
Lack of electronic data interchange to facilitate the e-procurement	No EDI to facilitate e-purchase orders, e-request quotation and e-contracting to suppliers
	Lack of EDI to facilitate e-quotation and e-invoicing from suppliers.
	PDF purchase orders uploaded emails or supplier portal
	PDF invoices by email or supplier portal
Data Security and quality Issues	High security industries such as medical or military. Chose not to get connected electronically with suppliers.
	Purchase orders and invoices by email instead of direct data transmission
	Data quantity and quality
Top management and headquarter support	Support in resources of budget and manpower
	Top management did not see the immediate benefits of emerging technologies
	Multinational companies did not get direction or motivation from headquarters to invest on emerging technologies
Financial justification	Expensive to invest on emerging technologies
	No tangible and immediate benefits

	Financial constraint due to company restructuring and downsizing
	No cost efficient for 3D printing as compared with mass production

5. CONCLUSION

This research concluded with six challenges of emerging technologies as experienced by procurement professionals located in Malaysia. Generally, most of the findings are consistent with previous researches. However, there are unique findings from this study. For example, procurement professionals lack of talent in data science; data scientist lack of procurement knowledge to provide solution to procurement professionals; lack of direction and motivation from overseas headquarters; lack of EDI to facilitate e-procurement and lack of financial justification to adopt emerging technologies.

This research provides practical implications by creating awareness and recommendation to procurement professionals, top management of companies and policy makers. This research suggests procurement professionals to continue equipping themselves with the latest technologies related to procurement function. Top management and headquarters of industries are suggested to provide procurement professionals with more resources, trainings and supports pertaining to emerging technologies. This research also suggests government to support emerging technologies by providing companies with grants and tax incentives.

This research was conducted with qualitative methods in Malaysia, hence the findings could not be generalized for other countries. However, the purpose of this research was not for generalization but for revealing the lived experience of purchasing professionals with regard to emerging technologies.

Future research could investigate how procurement professionals could overcome the challenges of emerging technologies. Future research also could examine the benefits of adopting emerging technologies in procurement function. This research focused on procurement professionals located in Malaysia, future research could be conducted in other Asia Pacific countries. This research was conducted in qualitative approach; future research could be conducted in quantitative methods in order to reveal the adoption level and coverage of emerging technologies in procurement functions.

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