

A Qualitative Study of Data Management Development for Hybrid Organisation Application

<https://doi.org/10.3991/ijim.v16i13.30617>

Noorhasyimah Ismail¹(✉), Azlan Ab Rahman², Aina Mardziah Ahmad Rifa'i^{1,2},
Siti Munira Jamil¹, Nur Liyana Zakaria¹, Hanisah Abdul Rahman³

¹SPACE, UTM, Johor, Malaysia

²UTMSPACE, Johor, Malaysia

³FSSH, UTM, Johor, Malaysia

hasyimah@utmSPACE.edu.my

Abstract—A revolution of information technology through big data for data processing is greatly affecting organisations around the globe, specifically the education providers. Subsequently, there are increasing needs and demands for software, digitalisation, and processing power development for unlimited database development and applications. The study aims to determine how well-prepared UTMSPACE is in meeting the new data management planning requirement for developing the big data management application. This study is supplementary to the development of strategic management planning in digitalisation and data management. The study employs qualitative method for its exploratory and data processing application research. The findings will help to identify the weaknesses and strengths in preparing data management applications to achieve strategic management plan outcomes. The study suggests that the company must increase awareness on the importance of big-data management through data processing engines that provide a more organised and centralised data and information management. In addition, the results also share the type of data and information needed for prioritising the organisational strategies in implementing the lifelong learning programmes across different environments and sectors.

Keywords—data management, big data, higher education, Malaysia

1 Introduction

In recent years, there has been an increasing interest in higher education from being an educational institute solely to becoming key export revenue earners [1]. Such example is a university institution that is now rapidly competing over a record amount of competitive revenue. Of particular concern is a university that employs a hybridisation of education and business in their operating system, which places the big data management as an important aspect to perform well as both an academia and a business organisation. Hence, the study is to explore the preparation of the organisation in cooperating between demands and needs of big data management for their business-educational concern.

Big data is an unavoidable topic to discuss when it comes to how to organise it or what tools or ways to manage it as it is such an important matter in today's world. An organisation needs to apply an effective system of data management while being bombarded with large amounts of data in various forms. By definition, data management refers to the management of organisational information and data for secure and structured access and storage [2]. In addition, data management tasks outline data governance policy creation, analysis and architecture; database management system; data security and data source identification, separation and storage.

Furthermore, there are several important opportunities to advance the understanding of industry sustainability that relies on the business profit margin. It is where the resources play a crucial matter to an industrial success. For instance, the management in industry is responsible for making sure there are less unforeseen losses, and hence their profit margin is always a goal. Another potential opportunity that contributes to the losses of industry profit should be interpreted wisely by the management. Therefore, there is a gap on possible factors of data management impact to the organisation investment that the study needs to undertake.

2 Literature review

Management of data using effective IT system in higher education organisations is fundamental to the current business trend. It is required to create a change tool and constantly optimise higher education's specialty structure [3]; students' performance progress and graduation eligibility [4]; active student management [5] schedule [6] teaching and learning [7][8] test and examination [9] staff performance, and management [10][11]. That is to say the big data development and management is applicable everywhere in higher education operational and management process. Thus, it assists the process to become more efficient and provide better services.

Likewise, management and the usage of big data brings about benefits for higher education, ranging from as simple as helping towards better teaching and learning environment to future management planning and policy making [12]. Various methods and technology innovations have been adopted in higher education institutes. In addition, data has been used to the extent of biometric type of information. While data such as biometric technology is controversial for security and privacy, it is helpful in identifying students, access control, student management, academic teaching and learning processes [13].

Moreover, to better understand the implementation of data management and its development system, Parker [1] reveals that data management is a must for a private higher education institution for sustaining its competitive advantage. That is to highlight that big data management and application in private universities is a key factor to education-business provider's success. Therefore, there is a need of being smart to generate more revenue using the right resources from the big data and information.

By drawing on the concept of lifelong learning, Ferreira [14] and Parker [1] portray that an institution is to be true to the roots in educating people, seeking the truth, helping communities, and preserving culture values as their keys of education provider. In relation to that, the private higher education institutions must find a way to the main academic centre of gravity without losing administrative and management capacities of the institutions and their missions [1]. Hence, achieving the balance between academic and business requires

not a single set of data that able to share, access, and discover organisation-wide data. Also, it able to transform into significant understandings at every level of the organisation.

Data management and development process with high usage of IT system and application are the central of attention in the emergence of Covid-19 over the past few years. Besides, the movement in technological innovation and industry demands is faster for higher educations to change [15]. That is a centre of interest to organisations as higher education providers in reflecting the importance of teaching and learning aspect, which is a key to strategic and competitive resource, that results in an effective management strategy of the business. Hence, preparing students for future work is of great interest in the study that enhance the worth of today's higher education system.

Furthermore, the issue of big data management and development system to all universities especially to the stakeholders is the expectation on the latest and effective technological capabilities development. Those institutions that have implemented big data management are yet to explore the organisational benefits and challenges of doing so. For instance, the arrival of the Covid-19 has affected the education sector which has been forced to move fast in terms of technology [16]. Thus, it is necessary to adopt data management system for all higher education institutions or organisation.

Overall, the effective application of big data and management has the potential to alter economies, bringing a new era of productivity growth and consumer surplus [16] [18][19]. Although some research has been carried out on big data management and development, there is still a need to consider the need for big data management to a higher education with education-business aim. Therefore, the study is to determine how well-prepared the study context (a hybrid higher education in Malaysia) in meeting the data management and planning requirement for developing the application of it.

3 Research outline

The understanding of the term 'data and information management' of this study is developed from the conceptual source. In particular, this study aims to investigate the experiences and understanding amongst company's management personnel. For instance, such personnel/participant has undertaken the data management process at the department or division lead by each within the organisation. This is considering in one of the founded components involved, which is data management plans and guidelines aligned to company strategic planning. Another element that brings an impact on the understanding of participant to importance of the data and information to development and management experience could be analysed from the research finding and suggestions of application. Thus, the research objectives of the study are:

1. To explore the data management experiences in UTMSPACE.
2. To determine the big-data management development plan.

The fundamentals of institutional intention to contribute or perform data and information management of the educational-corporate or hybrid organisation environment are the company's concern. The development of data-information centres is a significant aspect of Big-data revolution demand [20]. Therefore, this study intends to give a recommendation on the right tools and provide efficient solutions to the concern of the study.

Furthermore, this study principle outlined based on the broad literature sources on the data and information management concept and big-data revolution study. Thus, the study aim to determine the importance of big-data management application to the organisation.

4 Research methodology

The research philosophy of the study is grounded on the general philosophy of education sociology. The study, specifically is to determine a basic of people or real-life experience settings. The objective of the study is a driver to adopt a qualitative approach. The concept of real-life experiences from epistemology and ontology concerns reveals the philosophical traditions that guide the study to answer the research questions in different ways.

Furthermore, the data collection process is carried out using the semi-structured interviews. The qualitative interview that focus to view the interviewees' position principally on how and why they have the perspective. In addition, the study has considered the diversity of participants which includes age, gender, job position and educational level within the organisation. The interview transcripts are analysed using thematic analysis. Thus, the study mainly highlights the participant's experiences through the diverse and in-depth perspectives.

5 Results and discussions

The findings of this study have revealed three (3) main themes from the thematic analysis which consist of the factors of data and information management experiences to the organisation. The findings have contributed insights and understanding from the experiences of the respondents on the internal drivers that include 1) organisation system for data and information, 2) efficiency of data management, and 3) development planning on data management and application. The following themes describe the findings.

5.1 Organisation system for data and information

The organisation of data and information was the first concern mentioned by the individuals who experienced big data at the operational and managerial levels. The uprising demand and needs on data and information during pandemic Covid-19 has pushed the organisation to enhance the hybrid higher education-business model and strategy. The model provides continuing education services and products with cost savings on the operational process during the pandemic lockdown phase through a digitalisation strategy. The organisation as an academic provider must be ready with the lifelong learning programmes online to meet the demand of local and international stakeholders around the globe. However, the respondents shared their views on digitalisation business model strategies that challenged them. For example, the data management using IT-system and application impacts the internal operation and needs upskilling in managing data and information. Thus, the business-academic model enhanced the managerial skill using current IT system demand and into digitalisation of working process.

Another view being emphasized among the respondents was the organisation of data and information using IT systems. Such a significant process involves big data, including data entry, collection, processing, and analysis. Data management using an IT system has made it available at any time and easy to access. The respondents mentioned that current application on data management was using a manual system. However, the action plan towards the organisation of data experiences continues to be explored and implemented. That later changed into the digital process of data and information management. The experience shared by the respondents revealed that there is a difficulty to access clean data due to the limitation of time and cost. One of the senior managers pointed out that data management using an IT system saves time and makes it available at any time. Hence, the driver for data management is using IT-system for big data organisation, development, and management.

5.2 Efficiency of data management

The findings of the study also shared that effective system to manage data impacts big data management effectiveness. The management system on data and information is significant to make data available and easy to access. For instance, one of the respondents shared the experience of handling data during a pandemic with a lockdown policy. The data that are unavailable and not ready on time resulted in a slow analysis process that contributed to failure of product marketing strategy development. Data preparation and its readiness must always be available at any required time with current and accurate information because it is a source of data for business strategy planning process.

Furthermore, the respondents viewed data management system as an essential business tool for the organisation. The data management within the division depends on the data type available and required by the organisation when needed. In detail, one of the respondents explained an example of data and information are not being centralised efficiently amongst divisions. Both data and information from student application (i.e. before process) and registration (i.e. after the process) can be utilised by the marketing department to make predictions based on figures and facts of student application vs registration, hence giving an overview on product demand analysis.

The impact of the inefficient data management system as described by one of the respondents of the study could lead to the data application system during the high demand of digitalisation of overall operational process as aimed by the organisation. The high-demand academic product mentioned by the respondent was online distance learning (ODL) mode type of programmes that are one of the key focus areas to the new business model of the organisation. The centralised data management is a significant factor for the hybrid organisation. Therefore, the existence of data centre will make it easy for current lifelong learning business investment planning.

5.3 Development planning on data management and application

Another aspect of data management experiences on individual is its application of data management system. One of the respondents shared in its recent strategic planning process, one of the organisation's internal strengths highlights the interaction between

big data management implementation, and international business investment. The study discovered that the main concern mentioned by the top management team is on the development plan in managing data system and application. The transformation of a multi-dimensional hybrid learning environment for business education affects the organisation to change into a new business model in lifelong learning strategy. Hence, a new action plan on data and information management and application becomes the critical aspects to the organisation.

Moreover, as stated by the senior manager respondent, the data management system is essential for business equipment as it bridges the industrial demand gap and employees' readiness for up- skilling and re-skilling in a digital world. Thus, teaching and learning in a hybrid education environment have shifted to meet the latest and effective technological capabilities development. In addition, another respondent mentioned a similar concern on different teaching and learning approaches that indirectly give the organisation to extend their planning on digital business frameworks such as towards virtual environment of online learning experiences.

The following Table 1 shows the examples of interviewed transcripts that also include some of the supporting evidence to the findings of this study.

Table 1. Transcription of participants' responses

Main Themes	Excerpt of the Responses
Organisation System for Data and Information	<p>“To me, the company has organised available data and information as its required. The only concerned me is on the readiness of the data processed and analysis when it’s needed” (Q1, a manager)</p> <p>“...that is my views on digitalisation business model strategies which I believed is a challenge to myself and other seniors. There is a high demand on the products with less opportunity if the organisation not prepared us with the digital needs and demand” (Q4, a senior manager)</p> <p>“data and information management is important to me as a manager. This is especially where everything with the internet of things...” (Q7, a manager)</p>
Efficiency of Data Management	<p>“data without a proper system is difficult to me. From my view, the system needs to be friendly user and easy to access (anywhere at any time)” (Q3, a senior manager)</p> <p>“...which what I meant is the data management organisation and management using IT-based or application. A good IT-system that gives information and data as an outcome as I needed” (Q5, a manager)</p>
Development Planning on Data Management and Application	<p>“The analysis of the company using SWOT analysis shared some of the gaps on the latest technological skills amongst employees as a threat. That could change the action plan which the gap needs to be addressed next year. Hence, the lack of experience amongst the senior managers on the digital environment is my concern” (Q12, a senior manager)</p> <p>“...where data and information management and development plan are complementary to be on the division action plan for next year. Yet, the data and information management and application first to include in the development plan in the strategic planning” (Q2, a manager)</p>

6 Conclusion

The study has discussed the significance of data and information management by exploring individual experiences in the organisation. The findings of the study has shown the data analysis from the interview with the managers and senior managers of the organisation. The study uses thematic analysis and three (3) main factors of data and management experiences to its application and development process. These include organisation system for data and information, the efficiency of data management, and development planning on data management and application.

7 Acknowledgment

This research work is granted by the Potential Development Fund (vote number: SP-USF2103) supported by UTMSPACE.

8 References

- [1] Parker, L. (2012). From Privatised to Hybrid Corporatised Higher Education: A Global Financial Management Discourse. *Financial Accountability and Management*. 28. <https://doi.org/10.1111/j.1468-0408.2012.00544.x>
- [2] Siddiqa, A., Hashem, I., Yaqoob, I., Marjani, M., Shamshirband, S., Gani, A., & Nasaruddin, F. (2016). A Survey of Big Data Management: Taxonomy and State-of-the-Art. *Journal of Network and Computer Applications*. 71. <https://doi.org/10.1016/j.jnca.2016.04.008>
- [3] Cui, H. (2021). "Dynamic Optimization of Specialty Structure of Higher Education Based on Big Data Technology," 2021 IEEE International Conference on Educational Technology (ICET), 2021, pp. 117–121, <https://doi.org/10.1109/ICET52293.2021.9563177>
- [4] Chandra, E., Girsang A. S., Hadinata R., & Isa S. M. (2018), "Analysis Students' Graduation Eligibility Using Data Warehouse," 2018 International Conference on Information Management and Technology (ICIMTech), 2018, pp. 61–64, <https://doi.org/10.1109/ICIMTech.2018.8528119>
- [5] Sutedja, I., Yudha, P., Khotimah, N., & Vasthi, C. (2018). "Building a Data Warehouse to Support Active Student Management: Analysis and Design," 2018 International Conference on Information Management and Technology (ICIMTech), 2018, pp. 460–465, <https://doi.org/10.1109/ICIMTech.2018.8528196>
- [6] Alavo, R., Adaikkalavan, R., & Hakimzadeh, H. (2018). "iScheduler: Intelligent Scheduling System for Academic Institutions," Proceedings of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education, 386–386. <https://doi.org/10.1145/3197091.3205824>
- [7] Wannapiroon, P., Kaewrattanapat, N., & Premsmith, J. (2019). "Development of Cloud Learning Management Systems for Higher Education Institutions," Research, Invention, and Innovation Congress (RI2C), 2019, pp. 1–6, <https://doi.org/10.1109/RI2C48728.2019.8999877>
- [8] Rupere, T., & Jakovljevic, M. (2021), Usability and User Evaluation of an Integrated Multimedia E-learning Management System.
- [9] Majernik J., & Urbanska, L. (2019). "Integration of e-Assessment Management System into Information and Communication Technology Infrastructure in University Education," 2019 International Conference on Information and Digital Technologies (IDT), 2019, 322–325. <https://doi.org/10.1109/DT.2019.8813426>

- [10] Ojokoh, B., Akinsulire, V., & Isinkaye, F. (2019). An Automated Implementation of Academic Staff Performance Evaluation System based on Rough Sets Theory. *Australasian Journal of Information Systems*. 23. <https://doi.org/10.3127/ajis.v23i0.2033>
- [11] Mattjik M., Akbar M., & Yasin M. (2020). Managing Human Resources In A Higher Education Institution: Managing The Lecturers. *International Journal Of Scientific & Technology Research*. Volume 9, Issue 1, January 2020, ISSN 2277-8616
- [12] Alkhalil, A. (2021). Decision Support Model to Adopt Big Data Analytics in Higher Education Systems. *International Journal of Advanced and Applied Sciences*. 8. 67–78. <https://doi.org/10.21833/ijaas.2021.06.008>
- [13] Hernandez-de-Menendez, M., Morales-Menendez, R., & Escobar, C. A. (2021). Biometric Applications in Education. *Int J Interact Des Manuf*. 15, 365–380. <https://doi.org/10.1007/s12008-021-00760-6>
- [14] Ferreira, A., & Hill, M. (2008). Organisational Cultures in Public and Private Portuguese Universities: a Case Study. *Higher Education*. 55. 637–650. <https://doi.org/10.1007/s10734-007-9080-6>
- [15] Sivarajah, U., Kamal, M., Irani, Z., & Weerakkody, V. (2016). Critical Analysis of Big Data Challenges and Analytical Methods. *Journal of Business Research*. 70. <https://doi.org/10.1016/j.jbusres.2016.08.001>
- [16] Weldon, A., Ma, W. W. K., Ho, I. M. K., & Li, E. (2021). Online Learning During a Global Pandemic: Perceived Benefits and Issues in Higher Education. *Knowledge Management & E-Learning*. 13(2), 161–181. <https://doi.org/10.34105/j.kmel.2021.13.009>
- [17] McKinsey & Company (2011). Critical Analysis of Big Data Challenges and Analytical Methods.
- [18] Khan, N., & Qureshi, M. I. (2020). A Systematic Literature Review on Online Medical Services in Malaysia. *iJOE*. 16(6), 107. <https://doi.org/10.3991/ijoe.v16i06.13573>
- [19] Qureshi, M. I., Khan, N., Raza, H., Imran, A., & Ismail, F. (2021). Digital Technologies in Education 4.0. Does it Enhance the Effectiveness of Learning? A Systematic Literature Review. *International Journal of Interactive Mobile Technologies*. 15(4), 31–47. <https://doi.org/10.3991/ijim.v15i04.20291>
- [20] Mustapha, I., Khan, N., Qureshi, M. I., Harasis, A. A., & Van, N. T. (2021). Impact of Industry 4.0 on Healthcare: A Systematic Literature Review (SLR) from the Last Decade. *International Journal of Interactive Mobile Technologies*. 15(18), 116–128. <https://doi.org/10.3991/ijim.v15i18.25531>

9 Authors

Noorhasyimah Ismail, SPACE, UTM, Johor, Malaysia.

Azlan Ab Rahman, UTMSPACE, Johor, Malaysia. E-mail: azlan@utmSPACE.edu.my

Aina Mardziah Ahmad Rifa'i, SPACE, UTM, Johor, Malaysia. E-mail: aina@utmSPACE.edu.my

Siti Munira Jamil, SPACE, UTM, Johor, Malaysia. E-mail: sitimunira@utmSPACE.edu.my

Nur Liyana Zakaria, SPACE, UTM, Johor, Malaysia. E-mail: nurliyana@utmSPACE.edu.my

Hanisah Abdul Rahman, FSSH, UTM, Johor, Malaysia. E-mail: hanisaharhanisahar@gmail.com

Article submitted 2022-03-06. Resubmitted 2022-04-13. Final acceptance 2022-04-13. Final version published as submitted by the authors.