Determining Why Facilities Management has been Conservative in Adopting Data Analytics

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Abstract: *The necessity for data analytics in facilities management is increasing due to the complexity of modern-days organisational requirements in the 21st century. Despite the emergence of data analytics that has benefited various businesses and industrial sectors, the facilities management sector has been conservative in adopting the technology. This would lead to severe challenges for FM to achieve continuous improvement and revolutionise the management of the facilities through the implementation of IR4.0. Thus, this paper aims to determine why facilities management service providers seem to be struggling to adopt data analytics in their operations. A literature review was carried out on existing literature on the topic. The selected articles were then critically evaluated for their quality and relevance to the subject matter and the findings were synthesised and summarised. The result suggests that facilities management service providers faced three challenges that contribute to their conservative adoption of data analytics in facilities management which are technology integration, organisational inefficiency, and financial constraints. The findings of this study could help to better understand why the facilities management sector has been conservative in adopting data analytics which could pave a path to identifying ways for facilities management service providers to adopt data analytics in their operations.*

Keywords: Data Analytics, Facilities Management, Technological Advancement
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1. Introduction

Facilities management (FM) is a specialised field and organisational function that aims to enhance core business performance and achieve organisational goals. FM enables the effective and efficient functioning of the workplace through a comprehensive approach that encompasses strategic, tactical, and operational aspects, ultimately contributing to the success of the core business. FM also enhances individuals' quality of life and productivity by focusing on the requirements of space, people, business process and technology.

FM benefits an organisation through the provision of most conducive work environment that promotes productivity, smooth business operations, and sustainability. FM also reduces an organisation's costs, risks, and environmental impacts. For example, a study by (Fadahunsi et al., 2019) found that adopting facilities management principles resulted in proactive maintenance, improved health and safety, a clean and tidy environment, quality services, and

functional buildings. These outcomes can lower operational expenses, prevent accidents and injuries, and minimise waste and pollution.

FM is a vital component of modern organisations, and its benefits can be boosted even further by the use of information technology. Many organisations have adopted information technology in particular data analytics in their practices to achieve various benefits more effectively. The same should apply to FM. FM should be able to leverage data analytics to optimise building operations and improve efficiency by providing data-driven insights and solutions. Internet of Things (IoT), smart buildings, automation, predictive analytics, touchless workplaces, and advanced HVAC systems are some of the technology trends that are transforming FM. These technologies can assist FM in monitoring, controlling, and improving various aspects of facilities operations such as energy consumption, equipment maintenance, space utilisation, occupant comfort, and safety. This however, is only possible through the utilisation of data analytics.

Data analytics is an area that employs computational and statistical methods to derive insights from data and facilitate decision-making based on data. It is a valuable tool for businesses as it allows them to extract insights from large amounts of data. This is consistent with (Nagaraj et al., 2015) who stated that data analytics is critical for businesses. Kaur & Phutela (2018) and Dwivedi et al. (2016) on the other hand stated that finding patterns and drawing conclusions from raw data is critical. Data analytics can significantly benefit FM to improve organisational efficiency and performance.

Data analytics is a rapidly gaining recognition from businesses in various sectors. Data analytics had its roots in the early 20th century when scientific management principles were applied to improve industrial performance and output. While data analytics became more popular in the 1960s as computers evolved into decision support systems that could process large amounts of data and generate insights for managers, businesses were still using basic analytics (basically numbers in a spreadsheet that were manually examined) to uncover trends and patterns (Reddy Nadikattu, 2020). In the 21st century, the development of big data, the cloud, and a variety of software and hardware tools have enabled data analytics to handle diverse and massive datasets from various sources and domains. Data analytics is now used in many fields and industries, such as marketing, healthcare, education, and social media, to provide valuable information for decision-making and problem-solving.

Data analytics has a wide range of applications across various industries that demonstrate its value and potential for enhancing performance, quality, and innovation. For example, in the telecommunication industry, operators use massive amounts of operational data for business processors in order to understand customer behaviour better. This helps them keep track of customer data and preferences, transform their products and services to meet customer needs and increase customer loyalty and satisfaction (Shukla et al., 2016). In healthcare, data analytics is widely used to improve patient care and outcomes. With the recent adoption of Electronic Health Records (EHR), they now have access to structured and unstructured data that is systematically collected for each event in the healthcare system or even contributed by the patients themselves (Wang & Stiglic, 2015). This data can be analysed to identify patterns, trends, risks, gaps, and areas for improvement in healthcare delivery. Another example of an industry that can gain benefits from data analytics is facilities management. Data analytics can help FM to track portfolio performance, effectiveness, asset utilisation, optimise asset efficiency, plan for long-term sustainability, monitor energy consumption, optimise maintenance schedules, and predict equipment failure. Past research has consistently

highlighted the benefits of data analytics in facilities management. According to (Thalmann et al., 2018), data analytics has the potential to improve industrial processes by lowering maintenance costs, preventing equipment failures, and optimising business operations. While (Gatica et al., 2016) also add that data analytics approaches can be used to realise predictive maintenance solutions by leveraging existing data from manufacturing facilities and reducing implementation efforts. According to (Yang & Bayapu, 2020), managing large amounts of data can be challenging, but with data analytics that are planned well, it can provide insights into different aspects of managing and operating facilities. This can help in making evidence-based decisions.

Despite all of the benefits that facilities management can gain from data analytics, FM has been identified as conservative in adopting data analytics. It is partly due to the fact that facilities management has been an industry that has been heavily depended on manual procedures and human perception rather than being driven by data analytics for decision-making. Some of the past research supports this by stating that the FM industry is known for being conservative and has long struggled with digitalising its operations (Granberg & He, 2018). Yang & Bayapu (2020) also added the architecture, engineering, construction, and owner (AECO) industries have been slow in adopting the data analytics. However, regardless of the issue, there is still a dearth of studies exploring why facilities management has been conservative in adopting data analytics. This lack of research represents a significant gap in our understanding of the reasons for data analytics adoption in facilities management, highlighting the need for additional research. While some past studies may have looked into the benefits of data analytics in facilities management, few have explicitly focused on why organisations in this sector have been slow to adopt this technology.

2. Literature Review

Facilities Management
Facilities Management is a critical aspect of any organisation and plays a vital role in ensuring organisational success and taking care of the well-being of the building occupants. According to the International Facility Management Association (IFMA), facilities management can be defined as a multidisciplinary profession that ensures the functionality of the built environment by integrating people, places, processes, and technology. Hence, facilities management is responsible for monitoring the operations of the buildings, properties, and other facilities. It involves managing and maintaining physical assets such as buildings, equipment, and infrastructure. Facilities management, on the other hand, is not a static profession. It has evolved in response to changing organisational and societal needs and expectations.

Facilities Management has grown in scope and complexity over time due to organisations and society's dynamic and diverse requirements. Initially, FM provided essential services such as cleaning, maintenance, and security, but due to cost-cutting in the 1970s, the scope of FM expanded to include more technical and complex tasks such as engineering, plumbing, and electrical systems. This complexity was partly driven by the introduction of computers in the workplace in the 1960s, which created new challenges and opportunities for optimising space, energy, and productivity (Wiggins, 2021). As FM evolved to meet changing business needs, it developed a strategic dimension aimed at aligning facilities with the organisation's goals and objectives. For instance, (Azman et al., 2014) state that the focus of FM is increasingly on strategic facility management, with facility managers devoting their attention to a wide range of concerns, including human resource management, real estate portfolio management, and quality management, as well as more traditional operational problems, primarily related to

building maintenance. The strategic phase includes analysing the current situation, identifying gaps and opportunities, and planning actions to achieve the desired results. This phase was recognised as essential for strategic organisational planning at the senior management level (Wiggins, 2021).

Data Analytics in Facilities Management

Data analytics is the science of extracting insights from raw data by analysing and examining it in order to identify trends that can improve an organisation's performance and decisions. According to (Gudivada, 2017), data analytics is the science of integrating heterogeneous data from diverse sources, drawing conclusions, and making predictions in order to enable innovation, gain a competitive business advantage, and help strategic decision-making. Data analytics is vital for decision-making in an organisation, particularly at the strategic level, as it can help to achieve goals and remain competitive in the industry.

However, data analytics is not a simple process that can guarantee optimal results. Data analytics involves a variety of challenges and limitations that need to be addressed and overcome for it to be effective and reliable. Some of the difficulties and reasons that can be found in the implementation of data analytics, according to the case study from (Yang & Bayapu, 2020), the significant challenges identified from the task processes were data accuracy, data transfer, and misunderstanding of software tools and data structure.

One of the challenges is the lack of data accuracy. The inaccuracy of the data resulted from inconsistencies in the way the information was provided, or mistakes made when inputting the data manually by human (Yang & Bayapu, 2020). Resulting from that could lead to a few consequences, such as inaccurate analysis or predictions, which can lead to wrong decisions or actions by the facility managers. Another challenge is the lack of data transfer. The problem with transferring data was due to the absence of compatibility between software tools, making it challenging to exchange information seamlessly (Yang & Bayapu, 2020). Due to that, different software tools could not communicate with each other as they are not compatible and make it challenging to integrate the data from an additional source. Therefore, to overcome this challenge, make the software tool compatible so that the integration of data can be done easily. Lastly, misunderstanding of software tools and data structure. The development of technology nowadays is moving at a rapid pace. Therefore, it is very likely that some individuals are unable to keep up with the pace of change. In order to promote consistency across the department, (Yang & Bayapu, 2020) recommended compulsory systematic training that is compulsory not only for data managers but also for supervisors and their staff. This would help to ensure that everyone is on the same page regarding data entry and management.

Data Analytics in Facilities Management Decision-Making

Practical decision-making skills in FM are necessary for the strategic, tactical and operational phases of management. It is critical to recognise that the decision-making process in facilities management is cyclical, with dynamic action playing a crucial role (Van Dommeien et al., 1990). Coordination and execution of specific projects or tasks that support strategic goals such as renovation, relocation, or expansion are part of the tactical phase. Therefore, facilities managers must make timely, accurate, relevant, and cost-effective decisions in both phases.

In addition to decision-making, technological advancements have transformed how Facilities Management operates. Therefore, with the adaption of more advanced technologies, FM became more efficient and effective. The emergence of various tools in this phase, such as Computer-Aided Facilities Management (CAFM) and Building Automation Systems (BAS),

have led to more effective building management. Technology has also enabled FM to reduce costs, improve productivity, increase user satisfaction, and increase sustainability by utilising data analytics, touchless technology, robotics, or automation. As reported by (Anker Jensen, 2008), the technological phase in FM started due to global competition, advancements in IT, rising office space costs, quality defects, and increased employee expectations are all reasons for the development of FM as a new discipline.

Despite the potential benefits of technology in Facilities Management, many facility managers are still lagging in implementing technology solutions, particularly in data analytics. In addition, (Yang & Bayapu, 2020) states that facility users can experience advantages from big data by reducing response time, downtime, and the number of facilities claims.

Factors Contributing to Conservative Data Analytics Adoption in Facilities Management
a) Technology Integration
The challenges of integrating different systems and technologies to work together seamlessly can be a complex and time-consuming process referred to as technology integration. This process can be complex in FM because different vendors may have developed different systems and technologies and may not have been designed to work together. As mentioned by (Singh et al., 2023), the lack of technical support and a lag in the use of analytical techniques can also contribute to the challenges of implementing data analytic tools in facilities management. This can complicate the process of technology integration, as organisations may lack the necessary knowledge of technology, software interoperability, cybersecurity and data privacy, and lastly, data quality issues.

i. Software interoperability
Software interoperability is the ability of various technology systems and software to communicate and exchange data. In data analytics, software interoperability is essential because it enables organisations to use data from multiple sources. Obtaining data interoperability allows a company to maximise the value of its data while overcoming the significant challenges posed by distributed data assets. As mentioned by (Al-Azab et al., 2021), data processing software is frequently associated with other rapidly evolving technologies such as machine learning, deep learning, artificial intelligence, and the Internet of Things (IoT). These technologies are frequently combined to form a more comprehensive and interoperable system capable of processing and analysing data more efficiently. However, a lack of software interoperability can often be a significant reason for adequate facilities management in an organisation. According to (Yang & Bayapu, 2020) same data are usually put in different software manually. It would reduce work efficiency, and it would be preferable if they were interoperable or could perform a few functions. The FM industry has long struggled with interoperability issues among its various systems (Konanahalli et al., 2022). The lack of interoperability can create barriers to data analytics in FM. For instance, if data from different systems cannot be integrated and analysed together, it may be challenging to gain a comprehensive view of facility performance or identify areas for improvement. Hence, there may be an escalation in the reluctance to adopt data analytics.

ii. Lack of knowledge in technology
Innovative digital technologies and tools are playing a crucial role in significantly enhancing FM function and operations. Without knowledge of technology, facility managers may struggle to use these tools effectively and realise their full potential. As noted by (Granberg & He, 2018), the concern is lack of competence which refers to knowledge among people working with new technology, such as facility managers and people capable of developing systems.

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Individuals with insufficient technological knowledge may be unable to effectively collect, store, or analyse data, resulting in inefficient data use. They may also lack an understanding of how to fully utilise data analytics tools or how to interpret the data that they do have. As reported by (Konanahalli et al., 2022), business leaders are falling behind in human expertise and talents. This means they may lack the necessary skills to manage and use data analytics tools effectively. As a result, they may be unable to fully utilise the data that they have, leading to inefficient data use and decision-making.

iii. Cybersecurity and Data Privacy

Cybersecurity is a mechanism for safeguarding data, including personal information, sensitive data, and other types of information that are critical to an organisation. In the digital world of today, where data is increasingly stored and transmitted electronically, cybersecurity is exceptionally crucial. Data can be easily compromised without proper cyber security measures in place, resulting in significant financial losses, reputational damage, and legal liabilities. In facilities management, cyber security is essential as it protects both physical assets and data information from cyber threats, primarily when data analytics are implemented. Many people are hesitant to apply data analytics due to concerns about data security and privacy. As commented by (Konanahalli et al., 2022) inability to properly control data generation and access have a lot of consequences in terms of compliance issues, unintentional data loss, data exposure to unauthorised users, and the accumulation of low-quality data. Therefore, with the help of cyber security, facilities management systems can be made more reliable when needed, which is essential for maintaining the safety and security of an organisation.

iv. Data quality issue

Data accuracy is critical in data analytics in order to gain detailed and correct insights that can aid in decision-making. However, data quality issues may arise, resulting in the presence of intolerable defects in datasets. These issues can reduce the data's reliability and trustworthiness, resulting in incorrect insights and poor decision-making. Many past researchers have highlighted data quality issues and classified them as one of the barriers to adopting data analytics in facilities management. For instance, a study by (Yang & Bayapu, 2020) found that inconsistent data collection and report creation led to a data gap in the process. Categorising work orders was challenging due to the absence of clearly defined criteria. Consequently, the initial categorisation of a work order may not match the final categorisation based on inspection, making standardisation more complex and problematic.

b) Organisational inefficiency

The success of implementing new technologies in an organisation is dependent not only on the tool's efficiency but also on the organisational culture that shapes how employees interact with these tools. Organisational culture plays a crucial role in the implementation of new technologies (Kumar et al., 2022) and is directly related to the importance of having positive work culture, adequate staffing, and good data management in ensuring data analytics tools are fully utilised.

i. Work Culture

The concept of work culture, which encompasses the attitudes, beliefs, and behaviours that shape the work environment, can be influenced by a variety of factors, including changes in work patterns, lifestyle preferences, and technological advancements. Many things have changed since the technological revolution due to the shift towards automation and computer-generated work. However, some organisations are resistant to following the updated technology. It is supported by (Nicolae (Stan), 2021) mentioned that no one is immune to

change, and this process has an impact on all members of an organisation, whether positively or negatively. It is important to note that technology provides numerous benefits to businesses. However, some organisations may find it challenging to implement these changes. To keep up with the rapidly evolving business landscape, the organisation must adopt change to stay competitive. As revealed by (Aishah Kamarazaly et al., 2013) though, some expressed concern that due to the apparent disruptions to work patterns, there would always be resistance to the early adoption of emerging technologies. Because of the reluctance, the adoption of data analytics has been conservative in FM. However, there are a lot of benefits that can be gained from the change, such as reduced cost, improved efficiency, and accuracy.

ii. Lack of staff

Insufficient personnel have recently become a widespread problem in a variety of industries. Many organisations have difficulty finding qualified candidates to fill critical positions, and the facilities management industry is no exception. The facilities management workforce is currently faced with the challenge of filling leadership and institutional knowledge gaps that have arisen due to retirements or resignations. According to (Yang & Bayapu, 2020), another significant challenge in implementing data analytics in facilities management was the lack of trained personnel. As a result, organisations struggle to implement data analytics and other technological advancements due to a shortage of experienced personnel. Moreover, the challenge of implementing data analytics is made more difficult by the limited number of individuals who possess the necessary skillset. According to (Sivarajah et al., 2017), organisations often lack skilled personnel or staff with analytics skills. This is also supported by (Delen & Ram, 2018), who stated that data scientists, who are often referred to as quantitative geniuses who can convert data into actionable insights, are scarce in the market, and excellent ones are challenging to find. (Al-Azab et al., 2021). Further emphasise that there is a shortage of qualified individuals in the field of data analysis, as traditional data-handling skills are insufficient in the case of big data.

iii. Data Management

Data management is a critical step in implementing data analytics which then leads to important insights. Effective data management enables people across an organisation to access their queries and find data more efficiently and confidently. Effective data management can assist in organising and storing large datasets in a way that makes them easy to access and analyse. However, there are a few barriers that are related to data management, and these barriers contribute to the slow adoption of data analytics in facilities management. According to (Sivarajah et al., 2017), the ability to process large datasets and vast amounts of data remains a critical challenge for outdated data processing applications and relational database management systems.

c. Financial constraints

Financial constraints may limit the use of data analytics tools, as they frequently necessitate significant investments in technology and staff training. Understanding the reasons for conservative data analytics adoption in FM is critical for organisations seeking to improve operations and achieve business objectives.

i. Lack of budget

Although implementing technology such as data analytics may be expensive in the initial phase, it can save more money in the long run. Businesses can leverage data analytics to make better decisions, enhance customer satisfaction, and boost revenue. However, (Konanahalli et al., 2022) argue that the required investment in Big Data Analytics infrastructure, equipment,

and skilled personnel can easily be viewed as expensive add-ons that are more likely to be opposed and difficult to defend. (Yang & Bayapu, 2020) Also, the FM department struggled to maintain financial stability because funds were not allocated proportionally to run and support facilities. Without adequate funding, facilities managers may lack the resources to acquire the necessary software, hardware, or data management systems to support the analytics programme. As (Delen & Ram, 2018) commented, even though the technology is inexpensive, establishing an analytics infrastructure costs a significant amount of money. Management of those businesses may be unwilling to invest in needed technology if they lack financial resources or a clear Return on Investment.

Table 1: List of reasons and summaries of past studies

| References	Categories of Reasons	Reasons	Description
(Al-Azab et al., 2021); (Yang & Bayapu, 2020); (Konanahalli et al., 2022)	**Technology integration**	Software interoperability	- Data processing software - Need to insert data manually - Issues between diver systems
(Granberg & He, 2018); (Kumar et al., 2022); (Konanahalli et al., 2022)		Lack of knowledge of technology	- Lack of competence - Employees prepared knowledge - Falling behind in human expertise and talents
(Konanahalli et al., 2022); (Sivarajah et al., 2017)		Cyber security and Data Privacy	- The inability to control data has consequences - Strong security infrastructure
(Yang & Bayapu, 2020)		Data quality issue	- Inconsistency in data collection and report creation
(Nicolae (Stan), 2021); (Aishah Kamarazaly et al., 2013); (Delen & Ram, 2018)	**Organisation inefficiency**	Work culture	- Impact on organisation positively and negatively - Resistance to early adoption of technologies - Cultural change
(Yang & Bayapu, 2020); (Sivarajah et al., 2017); (Delen & Ram, 2018); (Al-Azab et al., 2021)		Lack of staff	- Lack of trained personnel - Lack of skilled staff with analytics skills - Scarce in the market - Shortage of qualified individuals
(Sivarajah et al., 2017)		Data management	- Ability to process large datasets
(Konanahalli et al., 2022); (Yang & Bayapu, 2020); (Delen & Ram, 2018)	**Financial constraints**	Lack of budget	- Expensive add-ons - FM struggle to have financial stability

3. Methodology

To answer the research question to analyse the main reasons for Data Analytics adoption in Facilities Management from multiple perspectives, a literature review was conducted. The first step was to search for relevant literature using keywords such as "Data Analytics", "Facilities Management", "Challenges", and "Adoption". The search keywords were used in many different ways such as by putting "AND" commands in order to narrow down the topics and find relevant articles. The authors were able to locate some full-text research articles from online journals using search engines Google Scholar, Scopus, and Emerald Insight.

The criteria for selecting sources were peer-reviewed articles published from 2012 to 2022, all the journals were filtered in English, and focused on data analytics in facilities management or

any related fields. In the initial phase, 419 papers were reported based on the search terms in the electronic databases. After excluding any articles that did not meet the criteria based on their titles and abstracts, about 85 articles were included. Then, full-text papers were downloaded and reviewed. However, 70 papers were excluded due to being irrelevant to the topic and not primarily focused on data analytics and facilities management. Hence, leaving with 15 final articles to be reviewed. The overall flow diagram is shown below to briefly explain how the process of identifying papers was done.
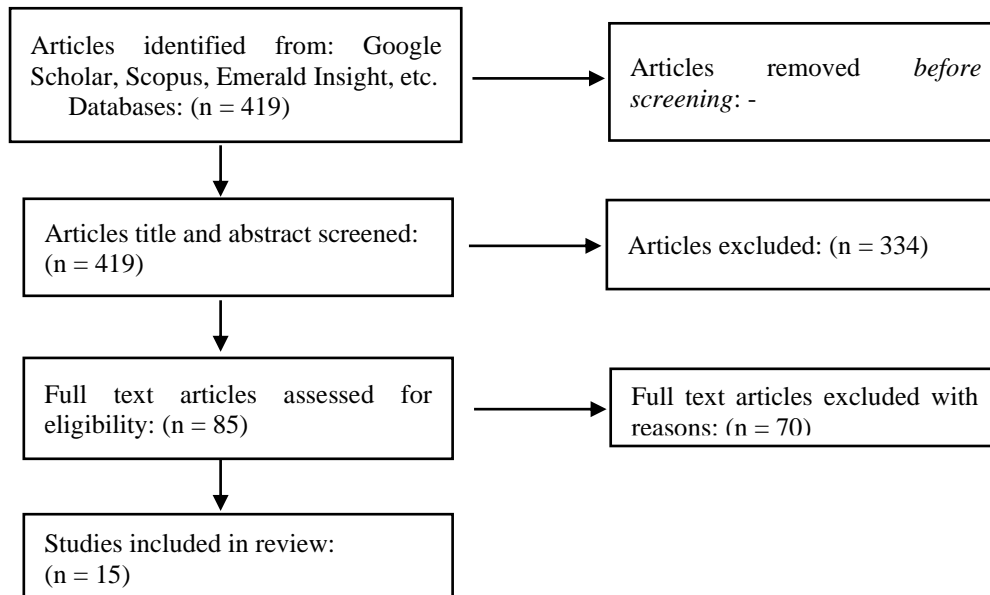
Figure 1: Flow chart of Literature Review method

Content Analysis

To understand more about the factors on the slow adoption of data analytics in FM, a content analysis method was performed. This method is widely used to analyse and evaluate textual data in a systematic and objective manner and frequently employed in a variety field of research. It enables researchers to derive valuable insights from enormous amounts of data and find trends and patterns that may not be immediately evident.

This paper conduct content analysis method and find the factors that were mentioned or discussed in several journals from 2012 to 2022 which provided an in-depth look at the current level of research in this field. The literature on the variables influencing the conservative adoption of data analytics in FM was retrieved. The retrieved results can be viewed in the supporting information. The data was then sorted by using Microsoft Excel. The analysis was based on the features of the outputs of publications, journals, and the frequency of the employed keywords. The chosen articles were examined, and relevant codes and categories for content analysis were established. By recognising the elements, content analysis was used to summarise the patterns in the literature.

4. Result and Discussion

Content Analysis result

As previously stated, the final journal papers that have been finalized are 15 studies. The table below present the categorised of the reasons according to the three main reasons which are technology integration, organizational inefficiency, and financial constraints. In the table

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below also included the author and the year of the journal paper according to their comments based on the categorization of the sub reasons.

Table 2: Overview Content Analysis Result

Factors	Sub-Factors	Description	Frequency	%
Technology Integration	Software Interoperability	Lack software interoperability can diminish work efficiency and present barriers to data analytics.	4	26.7
	Lack of knowledge on technology	Lack of technological knowledge may lead to some difficulty to use these technologies, resulting in inefficient data utilisation.	7	46.7
	Cyber security & Data Privacy	Failure to properly control data collection and access will lead to a lot of consequences.	7	46.7
	Data Quality Issue	Data quality issue can diminish data reliability, leading to inaccurate insights and poor decision making. Thus, result in data gap during the process and making standardisation more complex.	5	33.3
Organisation Inefficiency	Work Culture	Reluctance to adopt new technology has resulted in the conservative use of data analytics in FM.	8	53.3
	Lack of Staff	Organisations struggle to deploy data analytics due to a scarcity of experienced employees with the relevant skill set, particularly data scientist, who are in short supply in the market.	4	26.7
	Data management	Outdated data processing and relational database management systems make massive dataset processing difficult.	7	46.7
Financial Constraints	Lack of budget	The required investment in infrastructure, equipment, and qualified staff may be perceived as costly and difficult to justify.	8	53.3

Based on the result, the highest percentage of the sub factors are work culture and lack of budget with 53.3%. According to this result, this shows that both of these factors are the primary contributors to the conservative adoption of data analytics in FM. Following by technology related factors which are lack of knowledge on technology, cybersecurity and data management the second highest with percentage 46.7%. Hence, by addressing these issues organisations in FM may realise the full potential of data analytics and improve their operational effectiveness by tackling these concerns.

The result from the content analysis is shown based on the figure below:
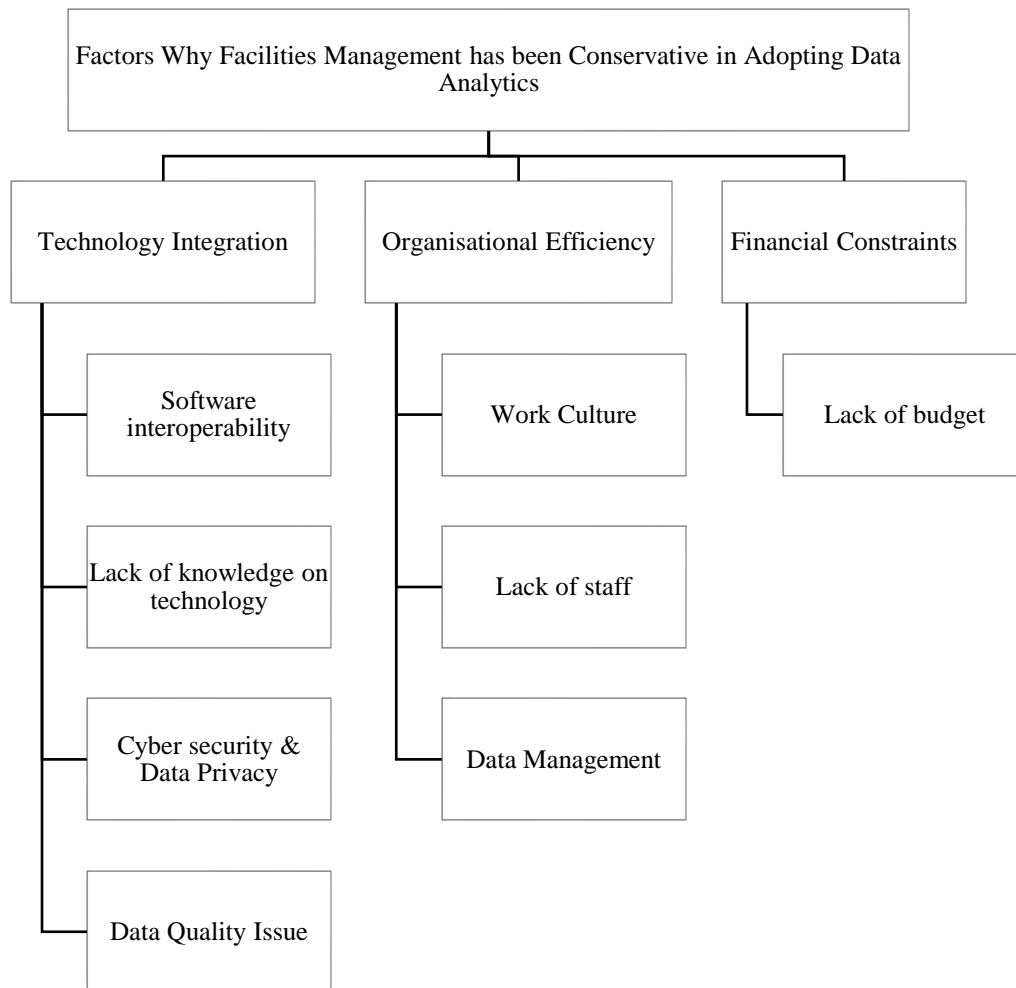
Figure 2: Factors why Facilities Management FM has been conservative in Adopting Data Analytics

This study aims to identify the factors that could lead to the conservative adoption of data analytics in FM. Overall, the technology integration plays an important role in the adoption as it enables the collection of data, management, and analysis by utilising multiple tools and platforms. These results are expected and in line with (Alalawneh & Alkhatib, 2021), that stated appropriate IT infrastructure, including hardware, software, and storage infrastructure, enables the business to quickly incorporate IT innovations. Therefore, it is important for an organisation to prioritise these issues, software interoperability, lack of knowledge on technology, cybersecurity and data privacy and data quality issue in their FM organisation. Organisations can educate their employees on the usage of technology and adapt the best practises for cybersecurity and data protection, as well as by maintaining the data quality. Organisations may enhance their overall data management practises and lower the risk of data-related incidents by addressing these areas. Therefore, technology integration is critical in ensuring that data analytics can be implemented effectively in FM.

Organisational inefficiency can result from various factors, including work culture, lack of staff and poor data management practises. According to (Kumar et al., 2022) critical organisational factors include security, privacy, digital infrastructure, and organisational policies. Previous research has emphasised the impact of work culture on employee performance and morale, which is consistent with the findings of (Gautam, 2020) who stated that a supportive work culture fosters a sense of belonging among employees, encouraging them to be more optimistic about their responsibilities, customers, and organisation. This issue also related with lack of

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staff, if an organisation does not have enough employees to handle their workload and they may become overworked and overwhelmed, resulting in decreased productivity and quality of work. In addition to that, poor data management also contribute to organisational inefficiency by leading to incorrect decisions, lost opportunities and wasted resources. Therefore, it is reasonable to conclude that these factors can adversely affect productivity, efficiency and employee satisfaction.

The final factors which is financial constraints, and it is appeared to be the most major factor influencing data analytics adoption in FM. Implementing data analytics systems necessitates substantial investments in hardware, software, and training, which can be too expensive for some organisations. As asserted by (Delen & Ram, 2018) management of businesses may be unwilling to invest in necessary technology if they lack financial resources. Furthermore, maintaining and improving data analytics systems can be costly, making it difficult for organisations to justify the initial investment. Hence, organisations that do not fully comprehend the potential benefits of data analytics may be unwilling to invest in the technology, even if they can afford it. As a result, due to financial constraints, many organisations may miss out on the benefits of data analytics.

5. Conclusion

Data analytics has been identified as a tool with numerous benefits for organisations. Many large industries have begun to employ data analytics in order to gain insights into their operations, identify areas for improvement, and make data-driven decisions. However, the implementation of data analytics in facilities management has been slow, according to past research.

Therefore, this study focused on analysing the reasons why Facilities Management has been conservative in adopting data analytics. The study's findings are based on an extensive review of the literature and previous research studies and highlight several barriers that hinder the conservative adoption of Data Analytics in Facilities Management. The findings of this study are significant because they can help to overcome the critical issues that facilities management organisations face when attempting to implement data analytics programs. By identifying these barriers, leaders in facilities management can devise strategies to overcome these challenges and improve their organisation's ability to use data for decision-making and improved operational performance.

Hence, further studies are needed to explore the extent to which the findings of this study are applicable to the Facilities Management industry in Malaysia. A survey among Facility Managers in Malaysia would be particularly valuable in determining whether financial constraints are a major barrier to the adoption of data analytics in the local context. By conducting further research in this area, we may acquire a deeper knowledge of the factors that drive the adoption of data analytics in FM and contribute to the development of effective solutions to support the industry's growth.

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