

Towards Examining the Social Implications of Technology Adoption on the Well-Being of Facilities Management Professionals

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Abstract

This study examines the effects of adopting technological innovations on the social well-being of facilities management professionals. The paper takes the form of an in-depth literature review of peer-reviewed publications focused on the primary constructs of the study, namely: technological innovations in facilities management; the role of facilities management professionals; and social sustainability in facilities management. The study found that the adoption of innovative technology has significant positive outcomes in the facilities management profession, but negatively affects the social well-being of the facilities management professionals. This paper provides the basis for the development of a social sustainability framework for the analysis of the impact of technological innovation on facilities management professionals. Further empirical study is needed to verify the findings. This review will sensitise facilities managers as it illustrates the impact of technological innovation beyond improved efficiency and service delivery by considering the facilities management profession as a whole.

Keywords: Facilities Management; Technological Innovation; Social Sustainability; Facilities Management Professional

1. Introduction

Facilities management (FM) is a profession that has many definitions, both by individuals and institutions. This study adopted a variety of institutional definitions to provide a broad overview of the profession. The International Facility Management Association (IFMA) defines FM as “*a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology*” (IFMA,

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2017: p.1). The British Institute of Facilities Management (BIFM) defines FM as a discipline that “*encompasses multi-disciplinary activities within the built environment and the management of their impact upon people and the workplace*” (BIFM, 2017: p.1). From the above definitions it can be inferred that FM is a profession that facilitates the conditions for the execution of business in the built environment. FM professionals are the “middlemen/women” between effective service delivery and the achievement of the organisation's core-business objectives. FM practice is currently seeing increased levels of sophistication with the integration of technological innovation into its day-to-day operations. A combination of the internet, Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), wearable devices, drone technologies, sensors and general robotics, are responsible for the current sophistication in FM practice (Atkin & Bildsten, 2017).

FM organisations, in response to changing business demands, have adopted these technological innovations. This technology, in meeting these demands, often improve the financial performance of the business but overlook the potential effect on the FM professionals (Grimshaw, 2005). Previous studies show that technology adoption leads to both expected and unexpected outcomes whether the adoption is in developing or developed economies (Ramaswamy, 2018). The ‘human element’ of FM, against the backdrop of technology-based uncertainties, raises certain questions about the sustainability of the profession and its professionals. Some of the salient questions include: would there be the need for FM services given that technology can perform many of the FM functions? What will be the potential future of FM professionals? How would the potential future of facilities managers affect their well-being? This paper will attempt to answer some of these questions from a theoretical point of view.

The discussion surrounding the future of FM and the FM professional is one that hinges on sustainability. Technological innovation and sustainability in FM are intertwined concepts. Sustainability consist of three pillars, namely: economic, social and environmental (Lehtonen, 2004). Technological innovation supports the concept of sustainability through the enhancement of economic operations and the reduction of environmental harm (Hilty & Aebischer, 2015). However, the effect of technology on the social sustainability pillar is unknown. Jensen et al. (2013) argue that the adoption of technology in FM organisations has left the social aspects of sustainability unexplored. The social pillar of sustainability has a broad perspective which includes, but is not limited to, equity, social justice, social well-being, social inclusion and social capital (Bebbington & Dillard, 2009). The focus of this study is on the social well-being of employees. Employee social well-being (ESWB) is crucial as it has implications for productivity and work relationships (Tov & Chan, 2012). It is important to state that ESWB is a concept that has been studied in a number of different academic fields. This has resulted in several views as to what constitutes as ESWB (Dillard et al., 2009; Magis & Shinn, 2009; Seghezze, 2009; Boström, 2012; Casula Vifell & Soneryd, 2012). Providing a comprehensive overview of the differing views on what constitutes ESWB is beyond the scope of this paper. Therefore, the study adopts the definition of ESWB as the maintenance and improvement

of employees' current and future needs (Chiu, 2003; Chan & Lee, 2008; Atkinson & Marlier 2010).

The concept of ESWB relates to employee's needs and desires. It includes assessing the present condition of employee lifestyle and determining whether the quality of life at the current stage is acceptable for future generations (Harris, 2000; Giudice, 2015). When dealing with an organisation or profession, ESWB involves a candid assessment of human resource policies and whether they are useful in managing employees. It implies that both the negative and positive impacts of business operations should be evaluated and gauged against the social well-being of all stakeholders. Previous studies suggest that it is crucial to give attention to ESWB issues that arise on account of technology adoption (Grimshaw, 2007; Bebbington & Dillard, 2009; Sveiby et al., 2009; Wienclaw, 2011). Furthermore, Boström (2012) argues that the neglect of the material impact of technology on ESWB compromises the quality of life available to employees.

In assessing the ESWB factors in literature, Grimshaw (2007) highlights social isolation, alienation, the intrusion of work into an employee's home life, overworking, and social networking as related impediments to ESWB. Furthermore, Magis and Shinn (2009) highlighted human well-being as one of the primary factors ESWB. In another study, Bebbington and Dillard (2009) highlight that job security, pay, fairness of employment practices, and freedom of association among the employment terms and conditions that enhance ESWB. Nam (2014) argues that using internet technology has social consequences regarding job satisfaction, job stress and work-life balance. Based on the assessment of the different factors of ESWB, this study classified them for ease of study into: job security, alienation, social network, work/home life balance, overwork, and social isolation. Each of these ESWB indicators will be discussed in more depth later in the paper.

The purpose of this paper is therefore to assess the impact of technological innovations in FM organisations on the social well-being of FM professionals. It does so from a theoretical perspective. The study explored how ESWB in FM organisations is affected by the adoption of technology advancement. The premise of the study is that, when facilities managers understand the implications of technology on the ESWB in FM organisations, it will form the basis for effective management. Hence, the paper will outline the role and function of the FM professional; technological innovation in FM practice; and the benefits and challenges of technological innovations to FM professionals. Lastly, the paper will examine ESWB within the context of the literature and will provide social well-being factors that may be used as the foundation for further research into the impact of technological innovation on FM professionals.

2. Methodology

The research adopted an interdisciplinary search of peer-reviewed publications (Falagas et al., 2008; Wong et al., 2018) for the impact-study on technology and ESWB. The journals were chosen based on their reputation and relevance to the current research topic. The articles were found by conducting a topic search using the keywords "facilities management" AND

“facility management” AND “technological innovation” AND “ICT” AND “automation in FM” AND “impact of technology on ESWB”. The search resulted in a total of 215 articles that related to the keywords. A review of the abstract and the findings of the articles was conducted to sort out the irrelevant and/or identical papers. After the process there were 47 papers that focussed specifically on technological innovation in FM. Comparatively, more information on the topic was available in industry publications than peer-reviewed journals. Hence, the researchers considered some reliable industry publications as sources of information. Furthermore, the conceptualisation of the ESWB issues within the study are multidisciplinary. It implies that the factors that make up the ESWB in this study were derived from many disciplines, many outside the realm of FM. Some of the articles on the impact of technology on ESWB were found in sociology, psychology and human development fields of study.

3. Role and Function of Facilities Management Professionals

Traditionally, FM functions were limited to an operational level. The primary aspects of the work include plant maintenance, care-taking, cleaning and general building management (Atkin & Brooks, 2009). Since its inception, the profession has developed in scope to encompass a wide range of skills and knowledge (Lunn & Stephenson, 2000; Tay & Ooi, 2001). Lunn and Stephenson (2000) argue that both the roles and functions of the FM professional are dynamic, complex and multidisciplinary. Goyal (2007) further argues that FM professionals manage multi-disciplinary activities in order to optimise asset value and their impact on people.

To effectively optimise value and impact of technology on employees, a facilities manager must function within an organisation at a strategic, tactical and operational level (Alexander, 1996; Nutt, 2000). At the strategic level, FM professionals are involved in the long-term strategic planning in the organisations. At the tactical level, FM professionals manage the execution of the strategic plans involving routine, specific short-term preventative or managerial operations (Patanapiradej, 2006; Langston & Lauge-Kristensen, 2013). Langston and Lauge-Kristensen (2013) further state that FM professionals engage with the day-to-day routine and support operations of organisations at the operational level. In addition, FM professionals manage the changes that organisations experience in their operations due to technological innovation. In the context of this paper it is necessary to examine the use of technology in FM practice, prior to the development of an appropriate ESWB framework.

4. Technological Innovations in FM Practice

Given the changing nature of business and the demand for effective service delivery, facilities managers adopt different technologies for various operations. The integration of technology into FM practice is also in response to market competition, growth of the practice scope, cost and relative market demands (Teicholz, 2001). While the traditional role of facilities managers centred around maintenance management, facility planning and services (Lunn & Stephenson, 2000), the roles of contemporary facilities managers have expanded and become more dynamic to include personnel and customer

services (Atkin & Brooks, 2009). The development of personal computers and software applications such as computer-aided-design (CAD) has automated some of the traditional FM functions (Lunn & Stephenson, 2000). Facilities managers use automation in maintenance management, facility planning and services to facilitate design and construction, space and asset management as well as layout evaluations, among other services. The use of an automated approach has led to a lower cost of doing business (Grimshaw, 2005; Gebauer & Schober, 2006; Alshamaila et al., 2013), and enhanced efficiency and service delivery (Dauda & Akingbade, 2011; Love et al., 2013).

The advent of the internet has resulted in a rapid transformation of FM practice. The internet enhanced the ability to execute simple queries, locate persons or an asset, submit a work order or request, investigate health and safety data, and display floor plans for easy assessment (Lunn & Stephenson, 2000). Nylén and Holmström (2015) state that in recent times, it has become increasingly difficult to distinctively track the progress of technological innovations due to the reduction in time that it takes for a piece of technology to become obsolete. The current era of FM, in terms of technology, is characterised by higher internet connectivity, AI, AR, and VR (Atkin & Bildsten, 2017). Each of these technological innovations signifies a concise classification of several hand-held and wearable devices that now drive FM practice. For example, the standard forms of AI used in FM practice include robots, drones and sensors (ambient intelligence); and AR and VR are enabled through devices that are powered by internet connectivity and the internet of things (IoT) (Bandyopadhyay & Sen, 2011).

There are several technological innovations in FM practice, however the technological innovations reviewed in this study were chosen relative to their impact on both the employees (human element) and the core-business of the organisation. Hence, this study categorised the different types of technological innovations in FM for ease of discussion into: the internet of things (IoT); cloud-based technology; drone technology; robots; and sensor devices. Although the building information management systems (BIM) qualifies as a relevant innovation, its major components of cloud-based services and sensors are independently studied in this research. An overview of each of these technological innovations is provided below.

i. Internet of Things (IoT)

IoT encompasses machine-to-machine communication (Vermesan & Friess, 2013). IoT has numerous applications in FM, which include but are not limited to building management systems, smart appliances, connected vehicles, and wearable devices. IoT enables the use of email, instant messaging, and mobile devices to promote flexible work schedules through enhanced connectivity (Abomhara & Køien, 2014; Hoeven et al., 2016). Through the power of IoT, FM professionals can operate from any remote location without visiting the site, use video conferencing, multimedia instant messaging, recording and photography with smartphones and social media technologies. The use of the internet enabled technologies enhances FM service delivery (Argenti, 2006; Abomhara & Køien, 2014; Hoeven et al., 2016). The internet also enables cloud-based technologies.

ii. Cloud-based Services

Cloud-based services have been defined in many ways, for instance, Wang et al. (2010: p.3) defines it as “a set of network enabled services, providing scalable, QoS guaranteed, normally personalised, inexpensive computing platforms on demand, which could be accessed in a simple and pervasive way”. Similarly, Plummer et al. (2008: p.3) define the cloud as “a style of computing where massively scalable IT-related capabilities are provided as a service using Internet technologies to multiple external customers”. Cloud-based services allow for on-demand information sharing that is readily accessible by resources scattered across virtual locations (Fred, 2010; Buyya et al., 2011; Lau et al., 2013). In the context of FM, cloud computing presents an opportunity for unifying the management of facilities in multiple locations (Lau et al., 2013). FM professionals can centrally monitor, control and manage all portfolios from a single location at an affordable cost (Grimshaw, 2005; Gebauer & Schober, 2006; Alshamaila et al., 2013), all with unlimited access to specialised software and the latest updates (Lau et al., 2013).

iii. Drone technology

Drones or Unmanned Aerial Vehicles (UAVs) operate under remote/autonomous control without any pilot onboard. Drone technology enhances service delivery and various operations. It enables the inspection of areas that are difficult to access or dangerous to inspect (Eschmann et al., 2012; Emelianov et al., 2014; Torok, 2014; Santos de Melo et al., 2017). FM professionals use drone technology for maintenance, security, and logistical operations (Rathinam et al., 2005; Wu & Zhou, 2006). In maintenance operations, drones are used to access problematic areas, check equipment performance and obtain valuable details about critical infrastructure like bridges at no risk to the employee (Metni & Hamel, 2007; Morgenthal & Hallermann, 2014). With the aid of remote-controlled cameras mounted on the drones, they can transmit images of building structures and machinery (Eschmann et al., 2012; Emelianov et al., 2014). Furthermore, they provide evidence to report on the general condition of roofs and identify structural issues in an environment that is potentially unsafe for human access. Drone technology therefore helps to enhance operational health and safety.

iv. Robotics

A robot is a machine which is programmed by computer algorithms to perform both simple and complex tasks (Murashov, 2016). Robots may be categorised as either service robots or industrial robots based on their predetermined operational specification (Lechevalier et al., 2014). Service robots include both personal service robots and professional service robots (Gorle & Clive, 2013). Personal service robots are used for non-commercial tasks, while professional service robots are used for a variety of workplace applications. Robots may be deployed for a variety of FM operations, these include: maintenance of buildings and pieces of machinery; cleaning of floors and building facades; customer care services (e.g. in hotels, malls, hospitals); and waste management operations (Chiemchaisri et al., 2007; Saeed et al., 2009; Gundupalli et al., 2017). According to Murphy (2015), Amazon, as of June 2015 was using some 15,000 robots to move goods around their

facilities, with plans of procuring more. This practice substantially reduces the need to employ humans for the same purpose. Among the benefits of utilising robots in FM include: efficiency, cost effective operations, and enhanced operational safety.

v. *Sensors*

In FM practice, sensors are categorised into infrastructure sensors and occupant-related sensors. Infrastructure sensors are used to manage strategic infrastructure like bridges, machine tools, and other industrial assets against any form of trespassing, attacks or activities of vandals etc. In contrast, occupant-related sensors are found in residential and commercial properties. They are used to control lighting; heating, ventilation and air conditioning as well as other presence-related space management tools (Vishal & Bansal, 2000; Yavari et al., 2014; Roth, 2017). The use of the sensors reduces the need for human professionals to physically monitor the facilities (Adama & Michell, 2017). FM professionals use occupant sensors to create ambient intelligence for energy management that are sensitive and responsive to the presence of people. For example, lighting can automatically turn on and off in spaces that are not occupied (Husu et al., 2017). In this manner, smart sensor devices help to reduce the operating costs, enhance productivity and improve the occupants' comfort and safety (Grimshaw, 2005; Gebauer & Schober, 2006; Alshamaila et al., 2013; Husu et al., 2017; Roth, 2017).

From the preceding overview, technological innovation and its adoption in FM has a noteworthy influence on FM practice. These outcomes are both intended and unintended in developed and developing economies (Ramaswamy, 2017). The intended outcomes of technology are increased efficiency, flexibility, and cost effectiveness. However, the unintended consequences are the outcomes that were not envisaged before the technology adoption process. For instance, most organisations do not consider the social implications of adopting technology and the potentially negative effects on the overall organisation's success (Grimshaw, 2007). When the overall goal of technology adoption negatively affects the social well-being of the employees, the question of how socially sustainability the technology is comes to the fore. Against this backdrop, the following section assessed the benefits and problems of technology adoption in FM.

5. Benefits of Technological Innovations in Facilities Management

From the foregoing discussions on technological innovations in FM practice, the benefits of adopting technological innovations to the FM profession may be summarised as an increase in productivity (Holmes et al., 2007; Dauda & Akingbade, 2011; Imran, 2014); reduced running cost (Grimshaw, 2005; Gebauer & Schober, 2006; Alshamaila et al., 2013); and enhanced efficiency (Dauda & Akingbade, 2011; Love et al., 2013). Other benefits include: enhanced corporate image through efficient service delivery to FM clients (Argenti, 2006); increased work flexibility in terms of time and mobility (Abomhara & Køien, 2014; Hoeven et al., 2016); increased connectivity (Grimshaw, 2005); and enhanced operational safety (Eschmann et al., 2012; Emelianov et al., 2014; Torok, 2014; Santos de Melo et al., 2017). Despite these benefits, studies note that the adoption of technology in FM is not

without some challenges (Grimshaw, 2005, 2007; Atkin & Bildsten, 2017). One can argue that these problems may have implications for the social well-being of the FM professionals themselves.

6. Problems of Technological Innovations in Facilities Management

The discussion outlined earlier indicates that there are significant drawbacks from the adoption of technological innovation. In undertaking this review, it would appear that the two most prominent challenges are: work-life balance (the intrusion of work into an employee's home life) and job security. However, Grimshaw (2007) affirms that the adoption of technology affects ESWB factors such as: social isolation, alienation, the intrusion of work into an employee's home life, overworking, and social networking. Therefore, the areas of ESWB that are impacted due to technological innovations are illustrated in Figure 1 and discussed below.

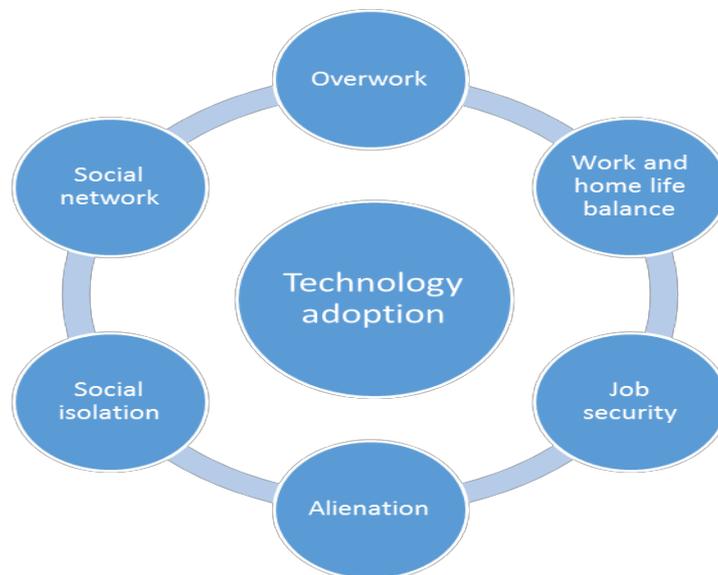


Figure 1: Employee Social Factors that are Impacted by the Adoption of Technological Innovations in FM Organisation

i. Job Security

Although studies of ESWB are not popular in the FM academic field, substantial research has been carried out in other fields of study that shows the implications of technology adoption on ESWB. For instance, a study in the field of health and social behaviour indicated that technology-induced job loss could increase the rate of depression by over 200% (Dooley & Ham-Rowbottom, 2000). Furthermore, Catalano et al. (2002) affirm in an annual review of public health that job loss can trigger psychological disorders and increase the chances of someone engaging in violent behaviour by a factor of six. Also, another study by Sullivan and von Wachter (2007) affirms that job dislocation increases the death rate of those laid off by 17% in the 20 years following their dismissal. This means that someone who is laid off at age 40 would live approximately 1.5 fewer years than someone who was not laid off (Sullivan & von Wachter, 2007; Pfeffer, 2009). Additionally, the anxiety created by the news of job loss as a result of technological innovations

triggers adverse changes amongst professionals in workplaces (Kivimaki et al., 2000). These studies imply that when FM professionals lose their jobs on account of technological innovations, it exposes the FM professional to the negative impacts of job loss highlighted above.

ii. Alienation

Alienation includes estrangement from the broader social world which can stem from a variety of factors including the work pattern of an organisation. It is a subjective feeling of a gap that exists between desired and the actual level of social contact (Perlman & Peplau, 1981; Valtorta, et al., 2016). From the analysis of Marx's early writings, work patterns created by technological innovation can trigger alienation whereby the employees lose control over their labour or the process of their work due to increased technological innovations. The new work pattern that evolves due to technological innovation in FM organisations encourages work alienation because technology takes control of the work processes (Bailey & Kurland, 2002; Kurland & Cooper, 2002; Grimshaw, 2007; Osin, 2009). Work alienation can also occur due to professional stress (Längle, 2003). Osin (2009) further argues that alienation can result in a state of dissatisfaction with oneself, loss of joy, and an inherent inability to cope with stress.

iii. Social Isolation

Social isolation is an objective measure of the number of contacts that people have (Ozcelik & Barsade, 2011). It is more quantitative than a qualitative based measure of people's relationships. The loss of a job due to technology can catalyse a state of social isolation for the employee. The level of social and psychological well-being decreases for an employee that loses their job (Brand, 2014). Furthermore, economic resources are embedded in the social network of individuals and therefore, social isolation reduces the chances of the employee securing another position in a short time (Bennett et al., 2010; Brand, 2014). Previous studies also report that social isolation— as a result of technological innovations— is more likely in virtual office practices (Marshall et al., 2007; Bennett et al., 2010). Virtual office practice is an online work opportunity adopted by organisations to lower operational cost and the mobility of employees. While social isolation can be overcome by increasing the number of people in a place, such short-term measures cannot easily be used to overcome alienation.

iv. Social Network

Employment influences how we identify and define our social networks. A social network involves joint activities and constant exchanges between members of an organisation or a social system. These interactions reflect the relationships that connect the actors in a social system (Zavaleta et al., 2014; Valtorta et al., 2016). Although people work in organisations to satisfy their needs, the opportunities created by the organisation also connects them to a social world. Therefore, when a social network is lost or taken away by evolving work patterns, people become disconnected from their social world. The strength of the social network of people with their friends, families and community influences their social well-being (Samuel et al., 2017).

Previous studies suggest that an array of social networks have a positive impact on health, well-being, job opportunities, financial security and the physical safety of people (Putnam, 2000; Kahneman & Krueger, 2006). Moreover, the absence of a healthy social network of employees can negatively affect the organisation's business. Social networks among employees are fostered through professional activities. A healthy social network among employees plays an essential role in productivity and attainment of core-business objectives (Nardi et al., 2002; Martin & Omrani, 2015). However, professional networking is increasingly being replaced by technology. Most of the complex job processes that will lead to social networking through trainings and seminars have been reduced to software thereby reducing the need for other forms of networking. In the context of FM, the introduction of the internet, which keeps the professional consistently connected and engaged in work, discourages physical contact. Hence, technology negatively impacts the social interactions of the professionals. Furthermore, the adoption of robots as field officers instead of humans reduces the level of social networking possible. Official interactions are more 'machine to machine' and 'machine to human' than 'human to human' in the globalised, technological, world.

v. *Work/home Life Balance*

The increased adoption of technological innovation like the internet and the cloud has blurred the boundaries between work life and home life (Nicholas & Guzman, 2009; Beutell, 2010; Nam, 2014; Fapohunda, 2014; Mokyr et al., 2015; Paul, 2016; Valtorta et al., 2016; Zhang, 2016). This situation is attributed to the fact that work can be performed from any location where internet connectivity is available (Grimshaw, 2007). A poor balance between work and home life is associated with stress, sub-optimal productivity, a decrease in psychological well-being and high absenteeism (Evans & Steptoe 2002; Jansen et al., 2006; Pfeffer, 2009). However, employees with a better work and home life balance have a greater sense of responsibility, ownership and control of their work lives (Pfeffer, 2009). Various studies suggest that employees demonstrate greater commitment and loyalty to organisations that respect and help employees balance their work and home-life (Thompson et al., 1999; Allen, 2001; Clark, 2001; Behson, 2002, 2005).

The work and home life balance of the FM professional is affected by the adoption of the internet, and all the handheld technological devices that are connected to the internet. The facilities managers are on duty on a 24/7 basis with these devices checking one facility or the other. Moreover, the facilities users are also able to access the professional FM irrespective of time and location in respect of the experiences in the facilities.

vi. *Overwork*

Overwork is among the factors responsible for workplace stress (Eikhof et al., 2007; Grimshaw, 2007; Kossek et al., 2009; Nam, 2014; Valtorta et al., 2016). It is considered a job-stressor which reflects the excessive demand that is placed on an employee to deliver on more tasks within a given timeframe (Ilies et al., 2007). Previous studies reveal that internet connectivity through teleworking has resulted in overworked employees (Hartig et al., 2007; Grant et al., 2013). In addition, flexible work patterns can lead to overworked

professionals (Haar, 2008). The resultant stress created by overworking negatively affects employees' physical health, emotional well-being and social relationships, which further impact on the productivity and profits of the organisation (Bickford, 2005; Krantz et al., 2005). It follows, therefore, that more resources are spent on health-care challenges when work induced stresses are not well managed. In the context of FM, the use of the internet and open hours of connectivity can cause overwork especially for virtual workers who must be continuously logged on to justify that they are working (Grimshaw, 2007).

7. The Implication for Theory and Practice

The adoption of technological innovations in FM operations is progressive, given the significant economic benefits that it offers the practise. Moreover, technological innovations are not within the domain of any one profession. All professions adopt technological innovations to enable their operations and to stay relevant in the competitive business environment. Within the domain of FM, it is cost effective to adopt technological innovations because of the flexibility, enhanced operational safety, productivity and efficiency it offers (Tremblay, 2002; Grimshaw, 2007). However, it is important to also consider the ESWB perspective for negative social consequences may arise. These social consequences impact the profession and the lives of its professionals. For instance, employees feel alienated, socially isolated, and their social network broken at the organisation level because there are only few people, all using technology to execute the tasks. Technology has erased the boundaries between work and personal life thus compromising the right to relaxation and the social well-being of the professionals. Therefore, this research examined the social implications of adopting technological innovations on the FM professionals.

From the discussion on the functions of FM professional, the researchers perceive that FM professionals are middlemen/women between efficient service delivery and the business of organisations. Similarly, the adoption of technological innovations stimulates efficient service delivery of the business of the organisation. Therefore, by extension, technological innovations have the potential of displacing FM professionals. Atkin and Bildsten (2017) argue that there would be no need to employ the services of professional FM when there are several types of technological innovations to do their jobs. Furthermore, evaluating sensors capability for diagnostic information to FM professionals and automatically controlling the environment where it is implanted, indicates the possibility that FM professionals can be bypassed. It may result in the development of new service level agreements (SLAs) between manufacturers of building elements, services and the consumer. For example, the manufacturer of a cleaning robot might charge the user of the robot a monthly fee for ensuring the robot is in efficient service condition, or the manufacturer of energy bulbs may opt to charge a monthly fee for ensuring that the lighting points always have serviceable bulbs. If this kind of SLA comes to fruition, it is possible that many of the maintenance activities at the operational level of FM may disappear. This could result in several social well-being challenges and broader societal problems.

Therefore, in summary, the adoption of technological innovations has significant positive influences on the FM profession but negatively affects the social well-being of the professionals and diminishes the demand for the professional facilities managers' role. Although the demand for FM services will not abate, achieving the supply will be through technological innovation rather than human facilities managers. Hence, the need to critically evaluate the professional FM's social well-being in the face of increasing technological innovations that can perform the role of the FM professional. There is a need for policies and frameworks that will guarantee the management of technological innovations in ways that the social well-being of the professionals is assured. In practice, facilities managers should go beyond what a technological innovation can do for service delivery to evaluate what such innovation could mean to the profession and professionals.

8. Conclusion

Technology and FM have become inseparable given the opportunities that are driveable from utilising technologies in FM services. Facilities managers that are interested in surviving the competitive business climate must adopt technologies for their operations. However, previous studies show that the adoption of these technologies could bring both intended and unintended consequences. Reflecting on the initial research question, given this knowledge of unintended technological consequences, it seems as though the routine manual FM operations will be lost to technological advancement. Although the services of facilities managers will continue to be demanded, most of the facilities managers that are dependent on manual operations may not find relevance in the evolving, technologically dominated, FM practice. It implies that the facilities managers must become more innovative with strategic management capabilities to manage data that is generated from the technologies.

With regards to the effect of the potential well-being of the facilities managers, the ESWB factors have proven to be crucial for the health and productive capacity of the employees. For instance, the feelings of insecurity among the employees leads to depression, triggers psychological disorders, violent behaviour, and in some cases, early death. Also, the study showed that technology adoption leads to alienation, because of the gap created between the desired and actual level of social contact. This condition is confirmed to be responsible for the loss of joy, and an inability to cope with job stress, both of which will affect the productivity and well-being of the employee. Furthermore, the study shows that the adoption of the technology could lead to a state of isolation whereby employees have limited physical contact with other employees. The emergence of virtual office practices encourages social isolation because work requires less physical contact. However, the condition of physical isolation leads to a lower level of psychological and social well-being.

Studies also suggest that when employees are in physical contact it enhances the social network between them. Meanwhile, technology leads to a change in job practices that require less physical contact, hence, limiting the extent of social network. Studies illustrate that the more employees are socially

networked, the better their social well-being. Furthermore, technology adoption also leads to more flexibility and the ability for employees to work from locations outside the traditional work environment. The process whereby employees are continuously connected to work through the internet has been associated with job intrusion into employee home life, overwork, stress and sub-optimal performance of employees

Subsequently, it was evident that the social well-being of the employees is affected by the adoption of technological innovations in FM organisations. The effect also impacts the productivity of the employees and thus the core-business objectives of the organisation. Consequently, this paper stimulates debate on the impact of technological innovation, both positive and negative, on the FM profession. Further empirical research is needed on the issues highlighted in this paper for a more comprehensive view of the social impact of technological innovation on both the profession and the FM professional.

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