

SUSTAINABLE FACILITIES MANAGEMENT PRACTICE AND ITS PERCEPTION IN HEALTH CARE ORGANISATIONS: A DELPHI SURVEY

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ABSTRACT

Health Care (HC) is one of the most polluting industries and recognised as the second energy-intensive sector. Integrating sustainability into Facilities Management (FM) is imperative and could significantly contribute to reduce energy consumption, waste and day-to-day operational costs. However, operations of FM vary upon facility types, business sector, organisation characteristics, cultural context and organisational scale. Thus, this study examines the current practice of sustainable FM and its perceptions in HC organisations in Sri Lanka. A Delphi survey was administered to 10 experts in two rounds, who are specialised in FM practices in the HC organisations. A semi structured questionnaire was deployed and collected qualitative data were analysed using content analysis whilst quantitative data were analysed through mode, mean and quartile ranges to reach consensus. With respect to FM practice in HC it was found that 8 out of 10 organisations had no separate departments for FM to conduct FM practices. The functions were collectively carried out among departments namely; engineering, quality assurance and housekeeping. Operations delays incur additional costs and disputes were reported constantly. Also, building services was found to be the topmost FM service practiced. Integration of sustainability is at a moderate level and FM practitioners face higher level of constraints of which “high costs” obtained the highest rank. The study is novel in offering the state of the art of FM practice in HC organisations and adds values and provides recommendations for further research to maximise the contribution of FM towards sustainable practice. It thus directs FM practitioners to support the future enhancement of HCFM.

Keywords: Facilities Management (FM); FM services; Health Care (HC).

1. INTRODUCTION

Health Care (HC) is one of the fastest growing industry in this 21st century as the demand for health related services are high due to growing and ageing population and elevated standard of living around the globe. For example; the growth of global hospitals and clinics reached \$3,693.4 billion in 2018, and has a compound annual growth rate (CAGR) of 8.2% since 2014 (The Business Research Company, 2020). In particular in US alone

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for the next five years the growth of HC sector is predicted to grow annually at a rate of 2.8% to \$1.2 trillion, with an expected increase of 1.6% in 2020 (IBIS world, 2020). The ever-increasing demand and the growth of the HC industry is also lead by the force of urbanisation and created an avenue for the need of more complex HC related facilities.

On the other hand, HC sector is observed as the second largest industry that emits and pollutes environment whilst in Brazil HC industry accounts for 10.6% of total energy consumption (WHO and HCWH, 2009). In a recent study, CO₂ emission in England specific to HC sector accounts for 18 million tonnes of these emissions 59% from procurement, 22% from building energy use and 18% from travel (Tomson, 2015). Similarly, US also generates over 3 million tons of solid waste per year along with other hazardous solid, toxic, infectious and radioactive wastes. Amongst, clinical waste is ranked among the top 4 sources in emitting and spreading harmful substances which lead to cause respiratory diseases and other illnesses to the community. Thus, integrating sustainability to HC will aid environment protection, occupants' wellbeing and stakeholder welfare (Diyer, et al., 2013). Buffoli, et al. (2014) emphasised that integrating sustainability into HC sector is a priority globally as these facilities play an active role in keeping the quality of the users' lives.

Integrating sustainable practices identified as an absolute solution to reduce the impact caused as workplace and productivity has a direct impact. This is where FM was recognised initially among building professionals and in time, FM found to be in a unique position in influencing the operational phase of a built facility in defining, analysing and examining the sustainability issues and to convert the physical product to a liveable and habitable built environment (Sarpin, et al., 2016). As being in charge of handling the operational phase of a built facility, FM was expected to handle sustainable practices. In regard, FM was found to be a "significant contributor or a key actor" in achieving sustainability in built environment (Elmualim, et al., 2010). Shah (2007) points out that SFM has evolved parallel with sustainable development and climate change concerns.

However, Meng (2014) indicates that the implementation of sustainable practice is not easy or straightforward as it tends to differ in number of ways according to facility types. These facilities differ from technical building components to the usage and economic contexts and has been evidenced through a number of studies. Further, the government of Sri Lanka provide medical service for free for all citizens of Sri Lanka. This has raised the life expectancy of people to reach 71 years, and the infant mortality rate at less than 13 per thousand live births (Rannan-Eliya and Sikurajapathy, 2009). Even though, HC medical delivery of Sri Lanka perform well an article in Sunday Times (2012) titled exposes the current HC system's approach as "hospital standards, doctors' ethics and profits" in which, the current practice of 'take-it-or-leave-it' attitude. Further the article highlights "channelled private practice has become a necessary evil and patients (rich or poor, big or small) are at mercy of doctors". This portrays the fact that HC organisations are ill-treating patients and its visitors, comparative to other industries. Given the information of the current status of HC system in Sri Lanka, the current research aims to explore the current FM and sustainability practice, and its perceptions in HC organisations.

The paper is structured in five main sections. The first and second sections presents literature review and research methodology respectively. Next section presents findings

on the current state of the operations of FM in HC organisations in Sri Lanka. Finally, discussion and conclusions are presented.

2. LITERATURE REVIEW

2.1 FACILITIES MANAGEMENT (FM) AND ITS PRACTICES

The development of FM is diversified as every country has its own culture with different type of requirements resulting to consider different approach of FM applications to meet the organisational goals (De Silva, 2011). Although, FM is one of the emerging and fast-growing disciplines, the evolution of FM is unpredictable in another 20 years of time. Thus, capturing the true essence of FM to create a common platform is challenging and solely rely upon FM practitioners who understands the real context of FM.

The operations of FM is not adapted as same for all organisation rather it is firm-specific and can differ. Hence, the selection of appropriate FM practice is very important and a hectic challenge borne by FM in organisations. Further, forming a separate department in organisations allows FM practitioners to handle and organise their FM operations. It gives the freedom for FM to decide on their FM operations and provides a platform for them being accountable for the operations they perform (Sarpin, 2015). In developed countries such as: Singapore, Hong Kong Australia, UK, and USA, majority of organisations comprise a department for FM to conduct operations of FM (Shi, et al., 2016). This enables FM to develop own strategies and determine the appropriate practice to support the core objective of the organisations.

2.2 FACILITIES MANAGEMENT (FM) AND HEALTH CARE (HC) ORGANISATIONS

In developed countries such as; UK, Australia, Singapore and USA etc. FM profession is recognised at the forefront in the delivery of successful medical care, ensuring zero defects by operating the facility without encountering minimum rate of failure for 24 hours (Lavy and Fernández-Solis, 2010). Unlike in other facilities, working as FM in HC requires different skills and standards (AHA Certification Center, 2017). In USA, the American Hospital Association (AHA) recognised the criticality and special requirements and introduced “Certified Healthcare Facilities Manager (CHFM)” certification programme (AHA Certification Center, 2017). FM practitioners who wish to practice in any HC organisation were required to obtain this certificate, which shows the gravity and importance of HC and FM practitioners’ contribution towards the HC. Thus, optimal running of the non-medical services interaction requisite of a great variety of FM services.

Healthcare FM by definition means,

“a healthcare facilities manager to manage the facility that they’re in charge of. Facilities managers should understand the building’s design as well as the equipment, both medical and not, that is used within”. (AHA Certification Center, 2017, p. 2)

FM and HC sector intersect the concept of “healthcare FM” in which firm-specific FM operations needs to be recognised (Lucas, 2012). However, the concept of healthcare FM is different from other sector or type of building management, such as office buildings, or educational or industrial facilities as HC is highly critical and consist of many unique features for caring for the health. Therefore, healthcare FM is one of the key elements for

the successful delivery of medical care as they are in a position of managing multiple services and coordinates among many other departments. Further, it was found in the literature that there is a gap to be matched, as FM context in the HC sector was not researched whereas office, residential and hotel are researched for a certain extent.

3. RESEARCH METHOD

Delphi is a widely used and accepted survey method for achieving convergence of opinion concerning real-world knowledge solicited from experts (Thangaratinam and Redman, 2005). This is also known as a consensus method to achieve a general agreement upon a certain problem. The Delphi survey endeavours to ascertain experts' opinions on the present issues and set future directions of any subject area to derive suitable solutions (Latif, et.al., 2016).

Delphi survey is a structured process requiring two or more rounds with the purpose of achieving consensus on the subject matter (Cassar, et al., 2014). The decision about the number of rounds is largely pragmatic depending on reaching the consensus (Thangaratinam and Redman, 2005). However, rounds for the Delphi survey require a minimum of two rounds (three if round one is open-ended). Further, the duration for a minimum of two round take as long as thirty days. Within the Delphi survey method, the experts have the possibility of modifying the previous round results in later iterations based on their ability to review and assess the comments and feedback provided by the other Delphi panelists. Thus, the key strength of the Delphi survey is the anonymous expert participation in a controlled feedback process initiated to reach an agreement (Hsu and Sandford, 2007). The first round of questionnaire was based on open and semi-structured questions. This comprised of question types such as; list, category and rating questions. Also, this questionnaire was designed in two sections. Amongst, the first section of the questionnaire designed to grab the background information of the experts' participants. The second section of the questionnaire comprised of open-ended and semi type questions to identify the current FM practice in HC sector. For example, how FM functions are performed, whether the organisation facilitate a separate FM department, what FM services are mostly practiced, how sustainability is integrated, difficulties and benefit they expect by integrating sustainability. This comprised of gathering both qualitative and quantitative data. The second round of the questionnaire was fine-tuned based on the first round results. This round intends to reach consensus on the factors that did not meet an agreement in the previous round. The first section of the questionnaire was given to revisit the experts' opinion on the previous round. The factors were provided with dichotomous questions by giving two options to select from "agree" or "disagree" to the previous round results. Accordingly, this paper presents the findings of the Round I and II of the Delphi survey and highlights the consensus of the experts on the current FM practice in HC organisations.

In a Delphi survey, Fiander and Burns (1998) criticised the use of larger participant sample as it leads to issues of data handling and difficulties in analysis. On the same view, Davidow, et al. (2001) argues the larger participants sample size as the results of the survey tends to give diminishing returns. Sekayi and Kennedy (2017) suggested the use of a sample of fifteen and in which minimum of seven number of participations is widely accepted. Given the details on the selection of the experts, a group of experts was selected to provide opinions on the integration of sustainable practices into the FM practice in the HC sector. Since the information solicited sound experience and in-depth knowledge

about the various sustainable practices in an HC industry, a purposive sampling was adopted. This is also referred as a judgmental, or expert sampling and the experts are chosen deliberately for the qualities or knowledge they possess (Bryman, 1996). In simple terms, the researcher decides what needs to be known, what details are needed and sets out criteria's and finds the suitable participants to take part in the research. Unlike random studies that focus on diverse cross section of backgrounds, ages, and culture the purposive sampling intends to concentrate on the nature of knowledge the participant possess and how he will support the relevant research (Etikan, 2016). The selection of the criteria for the experts were set as;

- should possess a minimum of ten years' experience in the field of FM practice
- have extensive working experience of a minimum of five years (past or current) in the FM practice in the HC industry

Accordingly, this research employed 10 experts consisting of (05) Facility managers, (03) Engineers, (01) Medical director and (01) Quality manager, who met the above requirement. Demographics of the respondents to the Delphi survey is as below;

As shown in Figure 1, all the experts hold either a bachelor's degree or master's degree. A 50% of them had master's degree while 3 and 2 of them hold a bachelor's degree in engineering and management, respectively. This distribution of participants shows that the experts participated in Delphi survey are knowledgeable and in capacity of understanding the subject matter.

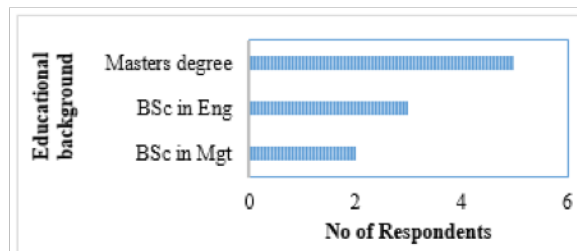


Figure 1: Educational background of Delphi survey participants

As presented in Figure 2, all participants had more than 10 years of experience in FM operations. Amongst, 2 of them had 16 to 20 years of experience while 8 of them had 11 to 15 years of experience. This shows that participants are well experienced in FM operations and in a position to understand the context of FM.

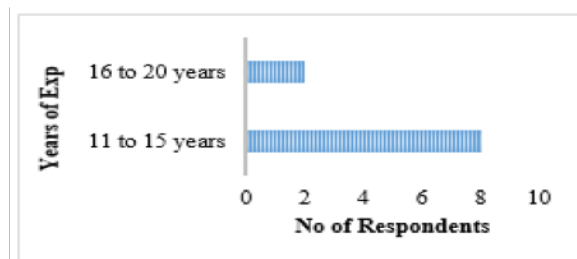


Figure 2: Years of experience in FM operations

Experiences of Delphi survey participants in HC operations were clustered as shown in Figure 3. Six participants had experience below 10 years in the HC operations, of which 2 experts had 1 to 5 years and 4 had 6 to 10 years. The remaining 4 participants out of 10 experts had substantial experience in HC operations with their involvement in the field

for more than 11 years. These qualities of Delphi survey participants ensure the creditability and quality of findings of the current study.

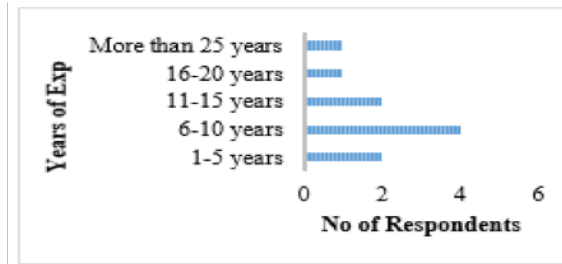


Figure 3: Experience in HC operations

With regard to the analysis of data, qualitative results were analysed using a content analysis. Similar words were grouped together whereas different terms were also looked into as it could mean the same issue. Researcher thereby grouped these into one universal description to provide a meaningful explanation of the topic. Central tendencies (mode and mean) and levels of dispersion (inter-quartile range) were used to analyse the quantitative data and to provide the feedbacks. To provide participants with information about collected opinion requires the functions of using these mathematical functions. Also past studies namely; Hsu and Sandford, (2007) and Thangaratinam and Redman (2005) had used these functions to communicate their feedbacks these are circulated in the prior rounds in the form of 30% disagreed with the statement, 25% strongly agreed with the statement, and so on. Thus, this study uses mean (Eq. 01), mode and quartiles to analyse the participants view and to provide the feedbacks. These were calculated as;

Mean

$$M = \sum_{i=1}^5 (F_i \times \%R) \quad (Eq. 01)$$

Where: M = Mean weight for an attribute; Fi = Frequency of responses for an attribute (ranging from 1-5); %R = Percentage response to rating point of an attribute.

Mode

The mode is the most commonly occurring data point in a dataset. It is calculated to analyse the aggregate value of the respondents for each of the Likert scale points.

Quartile range (QR)

Quartile range is a measure of variability, where the quartiles represent the values divided into four equal parts. QR allows understanding of where the bulk of the values lie, whether it is in the lower quartile (Q1) or interquartile (IQ2) or upper quartile (Q3).

Further, to provide feedback on each round, the decision on the consensus level should be set at the beginning of the study (Walker and Selfe, 1996). Consensus levels have been established as low as fifty-one percentage and as high as eighty percentage (Thangaratinam and Redman, 2005). Flores, et al. (2014) suggest the consensus level to establish at seventy percent as higher consensus levels mean majority of Delphi participants agree to the subject matter and it is more reliable to achieve the research objective. Accordingly, the overall consensus was set at 70% i.e. the accumulation of the “4-agree and 5-strongly agree” frequency obtained in all rounds of Delphi survey.

4. RESEARCH FINDINGS

In order to determine the current FM practice among the HC organisations in Sri Lanka the participants were asked to state their response in terms of; the existence of separate FM department to perform FM practice, what extent the FM services are practiced, how effective sustainability is integrated into the existing operations of FM and what barriers they encounter in adapting sustainability endeavours.

4.1 FM OPERATIONS IN HC ORGANISATIONS IN SRI LANKA

As shown in Figure 4, only 2 of the selected organisation had formed a separate department for FM related operations and they were solely undertaking maintenance and housekeeping related functions. Similarly, with rest of the 8 organisations the same functions were carried out but in a collective manner among engineering, quality assurance and maintenance departments. These collective measures in performing FM practice was not accounted by any person or a specific department which resulted in many disputes, delays in the operations, poor coordination. On the other hand, it was found that the organisations that had a separate department for FM had less disputes as accountability was explicit and borne by a single department.

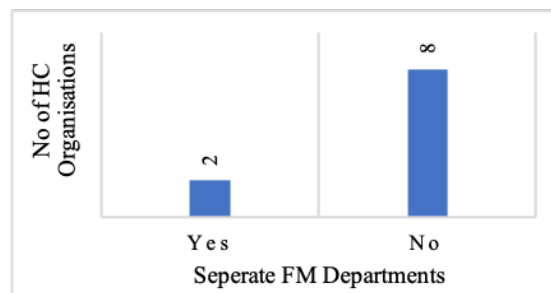


Figure 4: HC organisations with separate department for FM Vs Non FM

4.2 INTEGRATION OF FM SERVICES IN THE CURRENT OPERATIONS OF FM

The experts were asked to state, FM services which has been practiced in their HC organisation in the given five point Likert scale “1-not at all practiced, 2-rarely practiced, 3-moderately practiced, 4-often practiced and 5-always practiced”. Not at all practiced meant that the organisation never integrated the given FM service whereas always practiced meant that the organisation 100% practice that particular FM service.

According to Table 1, the majority of the participants stated that they always practice BS into their current operations of FM (as it received a mode value of 5). However, the lower quartile (Q1) and upper quartile (Q3) ranges got a value of 3.75 and 5, suggesting BS was either often or always practiced. Accordingly, an average mean value was calculated and BS received the highest mean value of 4.10 suggesting it is often practiced and integrated by all the selected HC organisations. On the other hand, quality management (QM) and risk management (RM) were often practiced as the results of mode had a value of 4. Also the quartile ranges, Q3 and Q1 suggested either often integrated or moderately integrated. Accordingly, the mean value determined the ranks and both FM services had a very slight difference that made QM the second most practiced service and RM as the third with the mean values of 3.60 and 3.50 respectively. Thus, both were considered to be moderately practiced in all selected HC organisations.

Table 1: Status of FM services adapted into the operations of FM

	FM services	Mode	Mean	Quartile range	
				Q1	Q3
1	Building Services (BS)	5	4.10	3.75	5.00
2	Quality Management (QM)	4	3.60	3.00	4.00
3	Risk Management (RM)	4	3.50	3.00	4.00
4	Human Resource (HR)	3	3.00	3.00	3.75
5	Operations Management (OM)	2	2.90	2.00	4.00
6	Project Planning (PP)	2	2.80	3.00	3.00
7	Financial Services (FS)	3	2.70	2.00	3.00
8	Information Technology (IT)	2	2.60	2.00	3.00
9	Space Planning (SP)	2	2.20	1.25	3.00
10	Real Estate (RE) management	2	2.10	1.25	2.75
11	Marketing Management (MM)	1	1.60	1.00	2.00

Majority of the experts had same opinion on stating that they practice human resources (HR) and financial services (FS) moderately (mode had a value of 3). However, in terms of the quartile values, Q1 obtained a very lowest value of 2.00 for FS and 3.00 for HR suggesting that first quartile range of experts were in the opinion of moderately practicing HR and rarely practicing FS in the selected organisations. Even for operations management (OM) and information technology (IT) had the same 2.00 first quartile value suggesting that 3 organisations practice these services rarely. Whereas, space planning (SP), real estate management (RE) and marketing management (MM) received Q1 value below 1.50 suggesting that in 3 organisations it is not at all practiced. In majority of the selected organisations, these services are either not at all integrated or rarely practiced because the upper quartile also had a value below 2.00. For example, five participants of Delphi survey informed that in their organisation, they do not practice or participate in MM functions and solely the marketing division handles it.

Accordingly, mean values were achieved for the remaining 9 FM services namely; OM, FS, PP and IT and it were determined to be rarely practiced. Whereas, SP, RE and MM were found to be least practiced as it had received a mean value of below 1.50. Lack of knowledge, poor coordination, and unwillingness of sharing information among departments are few of the reasons that participants stated for them to stick with the traditional practice in their organisations.

4.3 INTEGRATION OF SUSTAINABLE PRACTICE IN FM OPERATIONS

This section of the Delphi survey requested the experts to comment on the level of integration of sustainability in the given scale of “1-not at all integrated, 2-rarely integrated, 3-moderately integrated, 4-highly integrated and 5-extremely integrated”. According to Table 2, majority of the participants stated that they integrate sustainability moderately as the result of mode had a value of 3.00. In addition, the lower and upper quartile values also ranged in between 3.00 and 3.75 leaving us to conclude that the majority participants’ view firmed around the moderate level. In addition, the mean value also received 3.30 indicating that practices of sustainability was at a moderate level in the current FM operations.

Table 2: Integration of sustainability in the operations of FM

	Mode	Mean	Interquatile range	
			Q ₁	Q ₃
Current level of sustainability integration	3	3.30	3.00	3.75

In another attempt, participants’ opinions were gathered in terms of sustainability integration with regard to each individual FM services with same five point Likert scale as above.

According to Table 3, integration of sustainability into BS achieved the highest mean value of 3.60. Though the integration of sustainability is in a higher-level overall, one (01) of participants stated that they rarely integrate sustainable practices while another four (04) participants stated that they have moderately integrated sustainable practices and it is limited to aspects of HVAC, lighting sensors, water purification and waste water discharge.

Table 3: Extent of sustainability integration in FM services

FM Services		Mode	Mean	Quartile range	
				Q ₁	Q ₃
1	Building Services (BS)	3	3.60	3.00	4.00
2	Quality Management (QM)	3	3.10	3.00	3.75
3	Project Planning (PP)	3	2.50	2.00	3.00
4	Financial Services (FS)	3	2.50	2.00	3.00
5	Information Technology (IT)	2	2.50	2.00	3.00
6	Operations Management (OM)	2	2.40	2.00	3.00
7	Human Resource (HR)	2	2.30	2.00	3.00
8	Space Planning (SP)	2	2.10	1.25	3.00
9	Risk Management (RM)	2	2.00	2.00	2.00
10	Real Estate management (RE)	2	1.60	1.00	2.00
11	Marketing Management (MM)	1	1.30	1.00	1.75

Also, QM service has integrated sustainable practices to an extent of moderate level with the mean value of 3.10. Amongst, two participants revealed that they rarely integrate sustainability whereas 3 participants stated that they highly integrate sustainable practice. Amongst these 3 organisations sustainability is frequently monitored with quality control standards whereas, in rarely practiced organisation it is only carried out if there is a need.

Similarly, services such as; PP, FS and IT received mean values of 2.50 indicating a moderate level of integration of sustainability. Although, all three services received similar values, majority of participants stated they rarely integrate sustainability with respect to IT and currently maintaining the same technical systems as conversion for other systems require a lot financial support and training. Meantime, rest of the services namely; OM, HR, SP, RM, RE, and MM received very low mean values below 2.50 indicating, lease level of sustainability integration. These limited levels of sustainable practice integrations are mainly due to barriers experienced by the selected organisations.

Thus, next section explores the barriers in integrating sustainable practices into these FM services in the selected 10 organisations.

4.4 BARRIERS IN INTEGRATING SUSTAINABLE PRACTICES INTO THE OPERATIONS OF FM

Level of constraints encountered in the process of integrating sustainable practices and identifying significant barriers in integrating sustainable practices opinions were collected. A five point Likert scale of “1-no opinion, 2-strongly disagree, 3-disagree, 4-agree and 5-strongly agree” was provided to state Delphi survey participants on their opinion on the existing barriers that mitigates integrating sustainability.

According to Table 4, all the participants of the Delphi survey strongly agreed to the statement that they encounter many difficulties in integrating sustainability into the operations of FM with respective to their organisation. A mean value of 4.20 was received.

Table 4: Level of constraints in integrating sustainability

	Mode	Mean	Quatile range	
			IQ1	IQ3
Constraints in integrating sustainability into FM operations	4	4.20	4.00	4.00

The collective opinion of all participants’ opinion indicated that the constraints they encounter within the organisations are relatively very high in the process of integrating sustainability. Overall, in all 10 selected organisations integrating sustainability into the FM services is not easy but challenging. With regard, 32 barriers were listed and participants’ opinion on the most significant barrier are shown in Table 5.

Table 5: Significant barriers in integrating sustainability - DS: R I

Barriers	Mode	Overall consensus (A+SA)*	Mean	Consensus Achieved	Persue to Round 2
1 High cost	5	90%	4.40	Yes	No
2 Resistance to change	5	90%	4.10	Yes	No
3 Lack of finance	5	70%	4.10	Yes	No
4 Rigid requirement	4	80%	4.00	Yes	No
5 Long payback period	4	80%	4.00	Yes	No
6 Lack of legislation and forcing green building laws	5	80%	4.00	Yes	No
7 Political governmental issues	4	80%	4.00	Yes	No
8 Culture, attitude, norms and behavior of people	4	70%	3.90	Yes	No
9 Inadequate building laws	4	70%	3.70	Yes	No
10 Lack of green building material suppliers	4	70%	3.70	Yes	No

Barriers	Mode	Overall consensus (A+SA)*	Mean	Consensus Achieved	Persue to Round 2
11 Lack of training	4	80%	3.70	Yes	No
12 Lack of tested, reliable green building materials locally	4	80%	3.70	Yes	No
13 Lack of knowledge and capability	4	80%	3.60	Yes	No
14 Risks and uncertainty	4	70%	3.60	Yes	No
15 Company size	4	70%	3.60	Yes	No
16 Lack of Green building guides or codes or regulation	4	70%	3.60	Yes	No
17 Lack of government initiatives or support	4	60%	3.60	No	Yes
18 Improper property valuation system	4	60%	3.50	No	Yes
19 Duration of project	4	60%	3.50	No	Yes
20 Scarcity of resources	4	60%	3.50	No	Yes
21 Insurance liability issues	4	60%	3.40	No	Yes
22 Distrust of green building products	1	50%	3.40	No	Yes
23 Project location	4	50%	3.40	No	Yes
24 Poor quality of green building design	4	50%	3.30	No	Yes
25 Project complexity	4	50%	3.30	No	Yes
26 Lack of certificate	2	50%	3.20	No	Yes
27 Lack of promotion	2	50%	3.20	No	Yes
28 Bureaucracy	3	40%	3.20	No	Yes
29 Lack of communication and interest among stakeholders	2	50%	3.00	No	Yes
30 Lack of interest or demand from clients	3	20%	2.90	No	Yes
31 Lack of Technology	2	10%	2.40	No	Yes

*Overall consensus (A+SA) = accumulated values of the scale: “4-agree” + “5-strongly agree”

Significance of barriers were determined through overall consensus of participants. In regard, overall consensus is referred to the accumulated values of the Likert scale: “4-agree” + “5- strongly agree”, receiving a value of above 70% (see Section 3). Thus, 16 barriers had overall consensus of above 70%, indicating 70% of participants find these barriers as significant in mitigating the integration of sustainability in the selected organisations. Amongst, “high cost”, “resistance to change,” and “lack of finance” were the top most three barriers recognised with a mean value of above 4.00.

However, the overall consensus which obtained a value below 70% is considered as “consensus not reached” and carried forward to the next round as participants opinion had disagreement. For example; in table 5, “lack of promotion” barrier had an overall consensus of 50% agreeing that barrier being significant where rest of the 50% participants informed they do not consider it significant in integrating sustainability in their organisation. Similarly, 15 out of 31 barriers had split opinion with consensus of

below 70% and regarded as “non-significant” and these factors are highlighted with grey colour thereby it is carried forward to the next round. Table 6 presents findings of Delphi survey round II.

Table 6: Significant barriers in integrating sustainability - DS: R II

	Results Round I		Results Round II		Consensus	Pursue to Round III
	Mean	Overall consensus (A+SA)*	Agreement to the Round I results			
			Agree	Disagree		
Lack of government initiatives	3.60	60%	30%	70%	significant	No
Scarcity of resources	3.50	60%	20%	80%	significant	No
Lack of communication and interest among stakeholders	3.50	50%	30%	70%	significant	No
Lack of interest or demand from clients	3.50	20%	20%	80%	significant	No
Lack of certificate	3.40	50%	30%	70%	significant	No
Project complexity	3.40	50%	40%	60%	significant	No
Improper property valuation system	3.40	60%	30%	70%	significant	No
Lack of promotion	3.30	50%	30%	70%	significant	No
Bureaucracy	3.30	40%	70%	30%	non-significant	No
Lack of Technology	3.20	10%	80%	20%	non-significant	No
Distrust of green building products	3.20	50%	60%	40%	non-significant	No
Project location	3.20	50%	80%	20%	non-significant	No
Poor quality of green building design	3.00	50%	70%	30%	non-significant	No
Insurance liability issues	2.90	60%	80%	20%	non-significant	No
Duration of project	2.40	60%	70%	30%	non-significant	No

*Overall consensus (A+SA) = accumulated values of the scale: “4-agree” + “5-strongly agree”

The round II of Delphi survey assist the participants to revisit their opinion. In other words, Delphi survey participants were given the chance to amend the results in this round by either agreeing to the previous round result or disagreeing to the previous round results allowing them to revise the results obtained. In essence, in Table 6, eight barriers were revised and regarded as significant whereas rest of the 7 barriers remained same and regarded non-significant and highlighted with grey rows. Accordingly, 24 out of 31 barriers are significant in integrating sustainability and contribute in mitigating the adaptation of sustainability into the operations of FM in HC organisations.

5. DISCUSSION OF THE DELPHI SURVEY RESULTS

FM has evolved drastically within the last three decades. In developed countries, FM plays a vital role and well recognised. According to the findings among the selected private HC organisations 2 had separate FM department and only maintenance and housekeeping related functions were undertaken. Whereas 8 organisations that had, no separate department for FM jointly performed operations amongst departments namely engineering, quality assurance and maintenance and performed the same functions i.e. maintenance and housekeeping. However, the organisations which jointly performed their FM operations were constantly faced with delays in FM tasks and disputes, as there was no specific person accountable for operations of FM. With regard to developed countries the operations of FM are handled by separate department and FM profession is well recognised among stakeholders as FM brings many substantial benefits to the

organisations (AHA Certification Center, 2017). Thus, having a separate department in HC organisations will enable uninterrupted operations and support the organisations to achieve its core objective.

FM is a multi-dimensional (IFMA, 2016) or hybrid (Hodges, 2005) profession comprise of many varied services to support the core businesses. Apparently, in Sri Lankan HC organisations, operations of FM are being carried out fundamentally in BS while very few HC organisations have adapted quality management and risk management to a moderate level. Thus, it is very essential for FM practitioners in HC organisations to determine what FM services and how it could be integrated. On the other hand, the findings of identifying quality management and risk management being practiced next to building services, evidences the studies fundamental argument of FM operations being different to facilities. Quality management gained the next most moderately practiced service in HC organisations as they are vulnerable in spreading harmful substances and decrease to the environment whereas in other facility types such as education, hotel, housing, and office quality and risk management does not take a level of importance. Even though, FM operations are regard as hybrid or multi task, in Sri Lankan HC organisations it is only recognised for maintenance, housekeeping and partially performing quality related activities. Thus, this study points out the lack of service integration that HC industry faces.

Sustainability has become an inevitable agenda in all business activities around the globe. HC sector is not an exception; in fact, it is the most vulnerable sector to adapt sustainability. In regard, Universal Health Coverage (UHC) of Sri Lanka has taken a notable recognition in adapting SDGs to ensure healthy lives and promote well-being for all. Although, measures had been taken, current status evidenced that integration of sustainability in HC organisations are at moderate level (see Table 2).

Further, integration of sustainable practices into the individual FM services also found below the moderate level as only building services and quality management received a mean value of above 3.00 whereas other FM services received a value below 2.50 (see Table 4). This indicated that sustainable practices are rarely integrated into those FM services whereas in few organisation not at all practiced. Drawbacks and numerous difficulties are a major reason why still sustainability is yet a mere thought in many organisations. Similarly, the participants of the Delphi survey also stated the challenges and the constraints they face in integrating sustainability. The root cause that mitigates the integration of sustainable practices in HC organisations is found to be “high cost” and “long payback period” (see Table 5). These obtained highest mean values of 4.58 and 4.46. Even though, these two were highlighted there are 24 significant barriers listed in the study that is applicable to the local context. However, these two barriers highly affect monetary aspects of an organisation.

6. CONCLUSIONS

Operations of FM is at an infancy stage and encounter many disputes and delays as there are no specific department to handle FM related functions. Also, operations of FM were highlighted in the aspects of building services and rest of the FM services were either moderately practiced or not at all practiced. Although, FM is recognised as one of the forefront professions in HC facilities in developed countries, in Sri Lanka it is seemed as an engineer’s job with specific focus on hardware aspects. Even said that, one of the other

important finding revealed that the operations of FM vary according to facility type as quality management and risk management claims important in HC industry.

Another reason FM being at the infancy stage is, in Sri Lankan HC organisations, sustainability concerns are at a moderate level and comprise of numerous challenges as highlighted by all the participants of the survey. Also the integration of sustainable practices are mostly practiced into the building services and rest of the other FM services are given less importance. Also, given all the barriers financial barrier seemed to be the biggest concern that limits FM practitioners to integrate sustainability.

The findings of the study offer a foundation to equip the researcher and to determine the state of FM practices in HC organisations. Knowing the current perception allows the researcher to set a direction to implement a successful research focus on achieving the aim of the study which is to develop a framework to assess sustainable FM practice through addressing the existing significant barriers exists in the effective delivery of FM practice in HC organisations. This will enhance the current state of noncore services delivery and promote a better successful sustainable HC.

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8. REFERENCES

- AHA Certification Center., 2017. Certified Healthcare Facility Manager (CHFM). [Online] Available from: <https://www.aha.org/career-resources/certification-center/chfm> [Accessed 12 Jan 2020].
- Amaratunga, R.D.G., 2001. Theory building in facilities management performance measurement: Application of some core performance measurement and management principles. School of Construction and Property Management the University of Salford, Salford, UK, (October).
- BIFM., 2016, *Sustainability in facilities management report*, [Online]. Available from: <http://www.bifm.org.uk/bifm/knowledge/sustainabilityinfm/2016> [Accessed 12 June 2016].
- Buffoli, M., Gola, M., Rostagno, M., Capolongo, S. and Nachiero, D., 2014. Making hospitals healthier: How to improve sustainability in healthcare facilities. *Ann Ig*, 26(5), pp. 418-25.
- Cassar F, A., Marshall, S. and Cordina, M., 2014, Use of the delphi technique to determine safety features to be included in a neonatal and paediatric prescription chart, *International Journal of Clinical Pharmacy*, 36(6), pp. 1179-1189.
- Davidow, W.H., Uttal, B. and Porter, M., 2001. Consensus methods in prescribing research, *Harvard Business Review*, 67(4), pp. 77-85.
- Diyer, M., Namrani, H. and Elkadiri, A., 2013. *Land use and land management practices in environmental perspective*. China: INTOSAI WGEA.
- De Silva, N., 2011. Promoting the facilities management profession in the project development phase of high-rise buildings in Sri Lanka. *Built Environment Sri Lanka*, 9-10(1-2), pp. 37-44.
- Drion, B., Melissen, F. and Wood, R., 2012. Facilities management: Lost, or regained? *Facilities*, 30(5/6), pp. 254-261.
- Elmualim, A., Czwakiel, A., Valle, R., Ludlow, G. and Shah, S., 2010. The practice of sustainable facilities management: design sentiments and the knowledge chasm. *Architectural Engineering and Design Management*, 5(1), pp. 91-102.
- Fiander, M. and Burns, T., 1998. Essential components Of schizophrenia care: A delphi approach, *Acta psychiatrica Scandinavica*, 98(5), pp. 400-405.

- Flores, A., Marshall, S. and Cordina, M., 2014. Use of the delphi technique to determine safety features to be included in a neonatal and paediatric prescription chart. *International Journal of Clinical Pharmacy*, 36(6), pp. 1179-1189.
- Hodges, G., Poglitsch, R. and Ankerstjerne, P., 2014. Perspectives on the FM market development. Copenhagen.
- Hsu, C.C. and Sandford, B.A., 2007. The delphi technique, *Practical Assessment, Research & Evaluation*, 12(10), pp. 120-125.
- IBIS world., 2020. Hospitals Industry in the US - Market research report. [Online] Available from: <https://www.ibisworld.com/united-states/market-research-reports/hospitals-industry/> [Accessed 25. May 2020].
- IFMA., 2016. What is FM - Definition of facility management. [Online] Available from: <https://www.ifma.org/about/what-is-facility-management> [Accessed 6 September 2016].
- ISO., 2020. ISO 41001:2018: Facility management - Management systems - Requirements with guidance for use. [Online] Available from: <https://www.iso.org/standard/68021.html> [Accessed 12 June 2020].
- Latif, R.A., Mohamed, R., Dahlan, A. and Mat Nor, M.Z., 2016. Concept mapping as a teaching tool on critical thinking skills and academic performance of diploma nursing students. *Education in Medicine Journal*, 8(1).
- Lavy, S. and Fernandez-Solis, J., 2010. Complex healthcare facility management and lean construction, *Health Environments Research and Design Journal*, 3(2), pp. 3-6.
- Lucas, J.D., 2012. An integrated BIM framework to support facility management in healthcare environments. *Virginia Polytechnic Institute and State University*, pp. 1-224.
- Meng, X., 2014. The role of facilities managers in sustainable practice in the UK and Ireland. *Smart and Sustainable Built Environment*, 3(1), pp. 23-34.
- Pathirage, C., Haigh, R., Amaratunga, D., and Baldry, D., 2008. Knowledge management practices in facilities organisations: A case study. *Journal of Facilities Management*, 6(1), pp. 5-22.
- Rannan-Eliya, R.P., and Sikurajapathy, L., 2009. Good practice in expanding health care coverage. Research Studies.
- Sarpin, N., 2015. Developing people capabilities for the promotion of sustainability. PhD thesis, Queensland University of Technology.
- Sekayi, D. and Kennedy, A., 2017. Qualitative Delphi method: A four round process with a worked example. *The Qualitative Report*, 22(10), pp. 2755-2763.
- Shah, S., 2007. *Sustainable Practice for the Facilities Manager*. Sustainable Practice for the Facilities Manager. UK: Blackwell Publishing Ltd.
- Shi, Y., Du, J., Lavy, S. and Zhao, D., 2016. A multiuser shared virtual environment for facility management. *Procedia Engineering*, 145, pp. 120-127.
- Sunday Times., 2012. Hospital standards, doctors' ethics and profits, p. 6. [Online] Available from: <https://www.pressreader.com/sri-lanka/sunday-times-sri-lanka/20120311/287711270903280>
- Walker, A.M. and Selfe, J., 1996. The Delphi method: a useful tool for the allied health researcher. *British Journal of Therapy and Rehabilitation*, 3(12), pp. 677-681.