# IMPACT OF SPACE MANAGEMENT TO CORE BUSINESS OF SRI LANKAN HIGHER EDUCATION SECTOR: FACILITIES MANAGEMENT PERSPECTIVE

JAYASENA H.A.E.C.[1], ANUSHANGA B.A.H.[2] & GOWSIGA M.[3]

[1, 2,3] University of Moratuwa, Colombo, Sri Lanka

[1]ecjayasena@uom.lk, [2]heshananushanga1994@gmail.com, [3]gowgowsi9@gmail.com

**Abstract**

Education is a basic need of all human beings in the world as it turns a right of humans. Higher Education Institution (HEI) sector in any economy has responsibility to provide high skills professionals who participate to develop the economy. The outcomes of the HEI depends on satisfaction of occupants and effective environment in HEI. Thus, Space Management (SM) in HEI become an essential function in order to achieve the effective outcome from HEI. SM is one of the disciplines of Facilities Management (FM). However, Sri Lankan HEI sector has less concern to manage space in order to ensure the effective outcome from HEI. Therefore, this paper aims to investigate the impact of SM from FM perspective in Sri Lankan HEI sector to improving core business. This study was approached using the mixed method. Quantitative approach was applied to measure the satisfaction on existing SM in HEI sector and qualitative approach was to determine suitable SM concepts and strategies to overcome the causes of dissatisfaction on SM. Data collection was carried out through questionnaire survey from both students and academic staff of HEI's and semi structured interviews from both experts on construction designing and workplace planning. The gathered data were analysed through Statistical Package for Social Science Software (SPSS) in terms of content analysis and Relative Important Index (RII) to determine satisfaction against the existing SM. As the finding revealed that, different SM strategies under six main SM concepts which are healthy living, open space, key model space, modern workplace, universal design and common SM to overcome existing SM issues such as space allocation is not aligning with functional requirement, poor ventilation, poor visual and acoustic comfort, poor design specification and arrangements, unavailability /not enough space, insufficient parking and lack of disabled persons' space.

*Keywords*: Higher Education Institution (HEI), Facilities Management (FM), Space Management (SM), Concepts, Sri Lanka.

## 1. Introduction

Education is a primary necessity for humans to develop their socio-economic aspects and it might lead to turn out the knowledgeable humans for society (JICA, 2004 ), and it has been recognised as a principle way of fulfilling the ultimate goal of the country (University Grants Commission, 2013). Education can be categorized as four main stages such as early childhood development, primary education, secondary education and higher education (Ministry of Education, 2013). A successful evaluation to a skill-based economy depends on direction and contributions of HEIs especially universities, which must provide a knowledgeable and educated labour force (University Grants Commission, 2013). Thus, educated and skilled workforce is a valuable part of any economy and it may cause raising high productivity in economy (Glass, 2014). Because of that higher education faced unprecedented change within a short period of time (Daigneau, et al., 2005). As a result of rapid expansion of higher education, significant challenges were faced to ensure the quality of the higher education (Glass, 2014). Hence, universities should be functioning in an efficient manner of their resources to create the best use (Shahabudin, et al., 2012). However, space is one of the main challenges to ensure proper quality of higher education (Glass, 2014). Because mismatched usage of space and its design are led to facing common SM problem in most of HEI such as poor employment rate for teaching space, cost and productivity related issues (Shahabudin, et al., 2012). Therefore, space is most finite and valuable physical resource and it is considered as part of environment of any educational institution (Hashim, et al., 2013). Due to that, SM is a vital activity for all HEI and any other organizations (Ibrahim, et al., 2011).

FM concept consists of multi-disciplinary activities to manage the environment that affect to occupants and their places of work, thus, SM is one of the critical aspects of FM (Ibrahim, et al., 2011). As a key SM tool, FM aspects can be used to achieve maximum effectiveness and efficiency in day to day operations of the facility (Xia, 2004). Further, educational outcomes of HEI are partly the outcomes of the institutional-spacial qualities in which learning and teaching practices take place and disclose the institutional-spacial qualities to be partially identified by the educational facility services and

involvement of FM for making more value for education (Kok, Mobach, & Omta, 2011). Eventually, as a result of impact of SM in HEI, it can be considering as one of most vital elements in the FM (Shahabudin, et al., 2012). Therefore, proper SM is a vital cog in providing of quality higher education in any country. As a developing country Sri Lankan HEI has very few spaces and its quality depend on geographical locations of buildings. Thus, there are a lot of issues related to SM and it causes to poor performances of students and it leads to low quality higher education. In the modern built environment FM has become an integral aspect and SM comes under FM scope. Therefore, in other side poor SM partly represent poor FM in Sri Lankan HEI. Also, there are only very few research studies conducted on SM in HEI in Sri Lankan context. Hence, the aim of this research is to investigate impact of SM from FM perspective in Sri Lankan HEI sector to improving core business.

The structure of the paper opens with a literature review related to important concepts of the study. Then it presents the method used in achieving the aim of the study and finally it presents the discussion on research findings together with conclusions and recommendations.

## 2. Literature Review

Space is a physical sense (Haggans ,2015), however space can be discussed under mental and metaphorical aspects (Hod ,2017). "SM is an interdisciplinary endeavor that incorporates space, users, activities and technologies to plan and manage a working environment that effectively support core business goals" (Li, et al., 2017). Moreover, SM procedure has relationship between space with occupants and core functions of organization (Leung, et al., 2014). Thus, the requirement of practical SM of work environment can be considered as a major industry priority and due to that reappraisal of issues that recognize at SM is needed (Oluwoye & Ilozer, 1998) . Moreover, numbers of researchers are introduced different SM concepts by observing spaces utilization through different point of views, some of those SM concepts are narrative concept (Ropo, et al., 2015) , key space model concept (Steiner, 2006), modern workplace environment concept (Jylhä, 2015) , open space concept (Hanan, 2013) and the innovative concept of the "Educational Campus (Calvo-Sotelo, 2010) . FM is a profession that encompasses multiple disciplines to ensure functionality, comfort, safety and efficiency of the built environment by integrating people, place, process and technology (IFMA, 2019) . In addition, FM is wider than managing of non-core services in organisation and it aligned as "glue" between the core business and non-core services in organization (Pitt & Tucker, 2008). Moreover, FM has significant impact on the physical spatial environment in the organization, and it might result in increased the satisfaction level of organisational core business (Nik-Mat, et al., 2011; Silva, 2011). Therefore, arrangement of the spacial environment in organisation is a key function of FM (Kaya, et al., 2005) . According to Lozano, (2006) higher education is creating a mean to cultural and social changes through findings of researches and education of leaders, future makers and intellectuals. Accordingly, Sri Lanka is taking maximum effort to uplift the government university system to global level status while maintaining knowledge centre position of the South Asian. Therefore, now a day, higher education system in Sri Lanka is modifying their process to comply the modern-day necessities (Ushantha & Kumara, 2016). According to Den Heijer (2012), functional campus spaces are based on the requisite functions for a university's processes and goals, which are academic spaces (for research and education), residential spaces (for housing to students and staff hostels), business-related space (for partners linked to academic goals and supporting processes), retail and leisure (sports, cultural and catering facilities) and infrastructure spaces (ranging from accessibility to car parks).

## 3. Research Methodology

This research aims to investigate the impact of SM from FM perspective in Sri Lankan HEI sector to improving core business and achieve the following two objectives;
- To investigate SM problems in Sri Lankan HEI sector.
- To investigate of suitable SM practices to mitigate SM problems in Sri Lankan HEI sector.

According to the nature of the research, it was built up with mixed approach, both quantitative and qualitative aspects. Quantitative approach was applied to measure satisfaction level on existing SM in HEI sector in order to determine impact of SM to core business of HEIs in Sri Lanka. Qualitative approach was applied to determine suitable SM concepts and strategies to overcome the causes of dissatisfaction on SM. Questionnaire survey and semi structured interviews were selected as the data collection techniques. Questionnaire survey with closed ended questions was carried out among students and academic staff members in government HEI sector especially universities. Only three universities from the western province were selected for the questionnaire survey due to the time constrain and availability. Questionnaires were distributed almost equally within those three universities (34 respondents per university). This survey was done by using random sampling method and the sample size was decided with the data saturation and along with rule of thumb, minimum requirement of respondents for a questionnaire is 30. The questionnaire was distributed to 102 respondents and 88.24% (90 respondents) of responded.

Sampling is considered with selecting individuals in a population to implement the practical data collection and research process (Palys, 2008). This research was adopted the non-random sampling method to select individuals for data collection, because of data was collected from the desirable experts in industry based on their knowledge, experience and convenience of the researcher. The selection of samples was based on the experts who are engaged in designing of university construction project implemented in Sri Lanka and the Experts who having over 5 years' experience on workspace planning and design in different facilities. Four expert semi-structured interviews were carried out and details of them are as Table 1. Data analysis was carried out through SPSS in terms of content analysis and RII was adopted to analyze quantitative data. Further, t-test and frequency test were used for validation of the research.

Table 1: Details of the interviewers

| Interview Code | Designation | Experience |
|---|---|---|
| IC-PR-01 | Senior Architecture | 09 years |
| IC-PR-02 | Senior Architecture | 12 years |
| IC-PR-03 | Senior Architecture | 11 years |
| IC-PR-04 | FM | 6 years |

## 4. Research Finding and Discussion

This session contains the questionnaire and semi structured interview findings and discussion. At first, questionnaire findings were discussed. In line with the questionnaire survey, frequency of the overall satisfaction on SM in HEI is presented as table 2. Not satisfied/ Not dissatisfied includes both satisfied level or dissatisfied level to some extent. Thus, by excluding that, 11.1% and 31.12% were responded respectively as satisfied and dissatisfied with existing SM in Sri Lankan HEI sector. However, this was presented only respondent percentages about overall satisfaction. Hence, overall satisfaction rate was measured to determine the satisfaction level of all respondents on SM in HEI sector in Sri Lanka by calculating RII value and which is 56.44%. Accordingly, more than half respondents were satisfied, but most respondents (57.78%) were responded as not satisfied/ not dissatisfied, which means most of them have neutral level of satisfaction. Then next most responds were given to dissatisfied level. Therefore, existing SM in HEI sector in Sri Lanka was not achieved expectation satisfaction level and it might be resulted in reduce the efficiency level of learning outcomes from the Sri Lankan HEI Sector.

Table 2: Frequency of the Overall Satisfaction on Space Arrangement in HEI

| Satisfaction Levels | Frequency | Percentage |
|---|---|---|
| Extremely Satisfied | 04 | 4.44% |
| Satisfied | 06 | 6.66% |
| Not satisfied / Not dissatisfied | 52 | 57.78% |
| Dissatisfied | 26 | 28.89% |
| Extremely dissatisfied | 02 | 2.23% |

Six main functional areas were determined in Sri Lankan HEI sector through literature and questionnaire findings and important level of those areas were confirmed through t-test (Table 3). Accordingly, all the functional areas in HEI have important impact on learning and teaching outcome of both students and academic staff in Sri Lankan HEI sector by having all mean value more than 3.0 and positive t-values. Consequently, existing satisfaction levels on different functional areas were analysed through t-test. According to above results, excluding retail and leisure spaces, all other functional areas were resulted negative t-values whereas they were resulted mean value of less than 3.0. Therefore, excluding retail and leisure spaces, respondents were not satisfied with SM in all other functional areas in Sri Lankan HEI sector. However, retail and leisure spaces were resulted positive t-value but less than expectation level. Accordingly, all functional areas were resulted gap between the satisfaction level and expectation level.

Table 3: T-test- Important Level and Satisfaction Level of Different Functional Areas

| One-Sample Test, Test Value = 3, Sig.(2-tailed) | | | | |
|---|---|---|---|---|
| Functional Areas | Level of Important t-value | Level of Important (Mean Value) | Level of Satisfaction t-value | Level of Satisfaction (Mean Value) |
| Academic Spaces | 13.871 | 4.4000 | -2.646 | 2.7889 |
| Retail and Leisure Spaces | 11.185 | 3.9222 | 0.108 | 3.0111 |
| Infrastructure space | 8.647 | 3.9556 | -7.351 | 2.2444 |
| Business Related Spaces | 7.548 | 3.7000 | -0.732 | 2.9222 |
| Residential Spaces | 7.468 | 3.8556 | -4.284 | 2.5556 |
| Administration Spaces | 5.306 | 3.5444 | -1.539 | 2.8444 |

Existing SM issues in functional areas in Sri Lankan HEI sector were determined through frequency test and along with that, existing SM issues in functional areas in Sri Lankan HEI sector can be categories according to the Criteria for Categorization of Existing Issues presented in Table 4. Additionally, at the end of questionnaire data analysis, summary table was prepared based on this categorisation in order to find out the suitable strategies to overcome existing SM issues in Sri Lanka HEI sector, which is presented in Table 5.

Table 4: Criteria for Categorisation of Existing Issues

| Frequency Levels | Category of Issues |
|---|---|
| 25 > X | Minor |
| 25 ≤ X ≤ 50 | Moderate |
| 50 < X < 75 | High |
| 75 ≤ X | Critical |

Table 5: Categorisation for existing SM Issues based on frequency

| Functional Areas | Minor Issues | Moderate Issues | High Level Issues | Critical Issues |
|---|---|---|---|---|
| Academic Spaces | • Poor Space allocation for staircases<br>• Acoustic comfort issues<br>• Poor design specification | • Visual problems due to long distance from projection | • Poor Furniture arrangement<br>• Poor ventilation due to compact building/ room designing | • Not enough space for inside activities<br>• Lack of Moving Space |
| Residential Spaces | • Poor Space allocation for staircases | • N/A | • Unavailability of additional living/ cooking facilities<br>• Lack of Moving Space<br>• Poor ventilation due to compact building/ room designing<br>• Not enough space for inside activities in the building<br>• Poor Furniture arrangement | • N/A |
| Infrastructure Spaces | • N/A | • Lack of space between urinals | • Not having Car/ Bike parking slots separately<br>• Poor ventilation due to compact washroom designing<br>• Not having separate spaces for disabled persons<br>• Not having enough spaces in the washroom<br>• Insufficient spaces within parking slot<br>• Lack of Moving Space | • Not having specific place for student parking |
| Retail and Leisure Spaces | • Poor ventilation due to compact building/ room designing<br>• Unavailability of enough retail and leisure facilities | • Lack of Moving Space<br>• Poor furniture arrangement | • Not enough space for inside activities in the building | • Not enough space for different sports in playground and gymnasium |
| Business Related Spaces | • Not design to accommodate for huge numbers of students at once a time | • Poor Furniture Arrangement<br>• Poor ventilation due to compact building/ room designing | • Not enough space for queuing in peak time<br>• Not enough space for inside activities in the building<br>• Lack of Moving Space | • N/A |
| **Administration Spaces** | • Poor Space allocation for staircases | • Not enough space for inside activities in the building<br>• Lack of Moving Space<br>• Poor ventilation due to compact building/ room designing<br>• Poor furniture arrangement | • Space allocation is not align with functional requirement | • N/A |

SM strategies should be immediately given, according to the level of criticality. Even though, there is no critical issue in residential spaces, students and academic staff were expected all residential facilities and their expectations were not limited to bed, table, chair and cupboards. So, unavailability of additional living and cooking facilities with adequate spaces for free movements are the main SM issue in residential spaces in Sri Lankan HEI sector. Different SM issues were determined in different functional areas in Sri Lankan HEI from the above analysis. Some common issues were identified in different functional areas but their behavior is varied according to functional area. Therefore, expert interviews were carried out to find out suitable SM strategies to implement in different functional areas in Sri Lankan HEI sector in order to overcome existing SM issues. six main SM concepts which can apply for Sri Lankan HEI sector were determined via literature survey and semi structured interviews, and also the applicability of those concepts to overcome the existing issues in order to recommend the suitable SM strategies under each concepts were illustrated in the Figure 1 and Figure 2. All SM strategies were proposed from FM perspective because of those were validated by the IC-PR-04 (FM in HEI Sector).



Figure 1 : All Functional Areas SM Common Issues and Suitable SM Concepts and Strategies.

**EXISTING FUNCTIONAL AREAS IN SRI LANKAN HEI SECTOR**

**Academic Space**

Existing Issues
- Visual Problems due to long distance from the projection
- Acoustic comfort related issues
- Poor design specification

Proposed Strategies

**Healthy living concept**
1. Maintain proper distance
2. Add wall absorbers when design class rooms
3. Room dividers- use freestanding panels/screens to create internal zones

**Open space concept**
1. Arrange space without barrios such as walls, partitions, doors

**Modern workplace concept**
1. Provide spaces with similar capabilities for similar kind studying areas

**Residential Space**

Existing Issues
- Unavailability of additional living/ cooking facilities such as kitchen, living room

Proposed Strategies

**Key model space concept**
1. Arrange space with align the functional requirement

**Common space management strategies**
1. focus on multifunctional utilization of spaces
2. Allocate budget for space management
3. Adopt new technology

**Business Related Space**

Existing Issues
- Not designed to accommodate huge number of students at once
- Not enough space for queuing in peak time

Proposed Strategies

**Open space concept**
1. Arrange space with align the functional requirement
2. Arrange space without barrios such as walls, partitions, doors

**Common space management strategies**
1. focus on multifunctional utilization of spaces
2. Allocate budget for space management
3. Adopt new technology
4. Develop internal space management policy
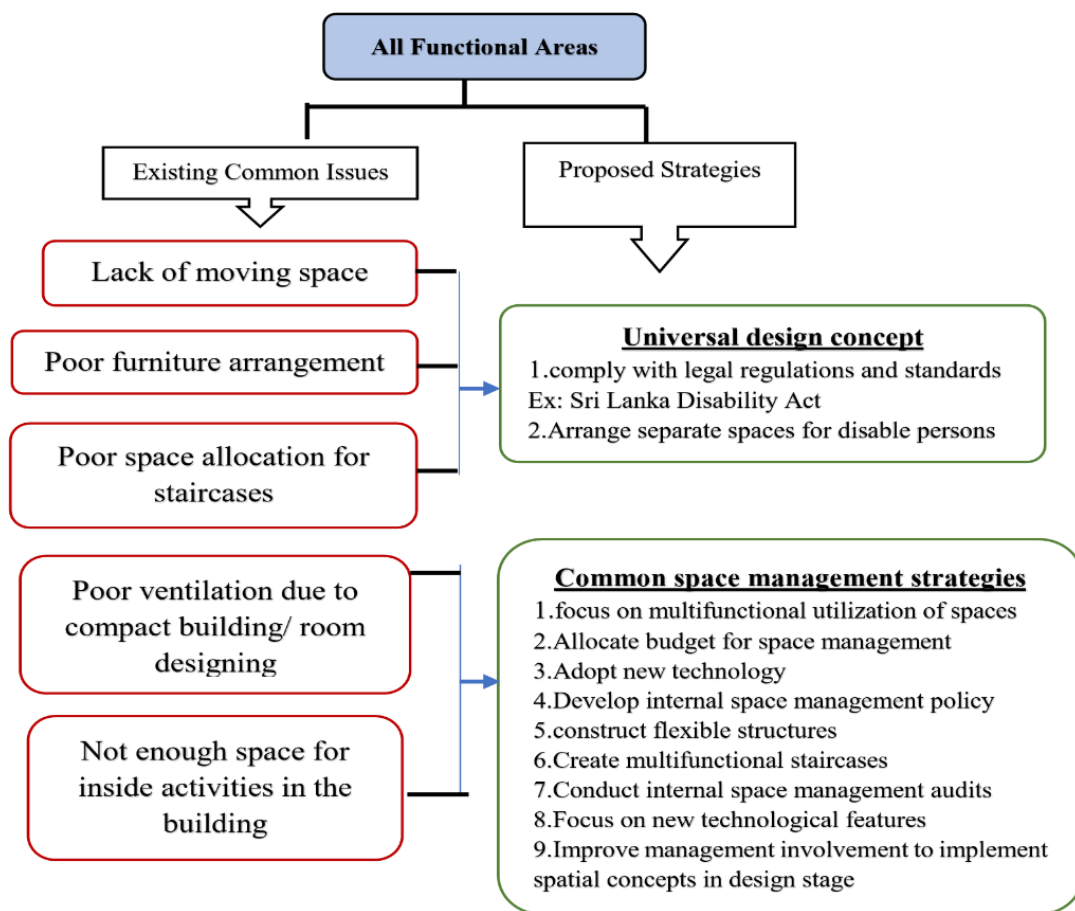
Figure 2 : Different Functional Areas SM Issues and Suitable SM Concepts and Strategies

**EXISTING FUNCTIONAL AREAS IN SRI LANKAN HEI SECTOR**

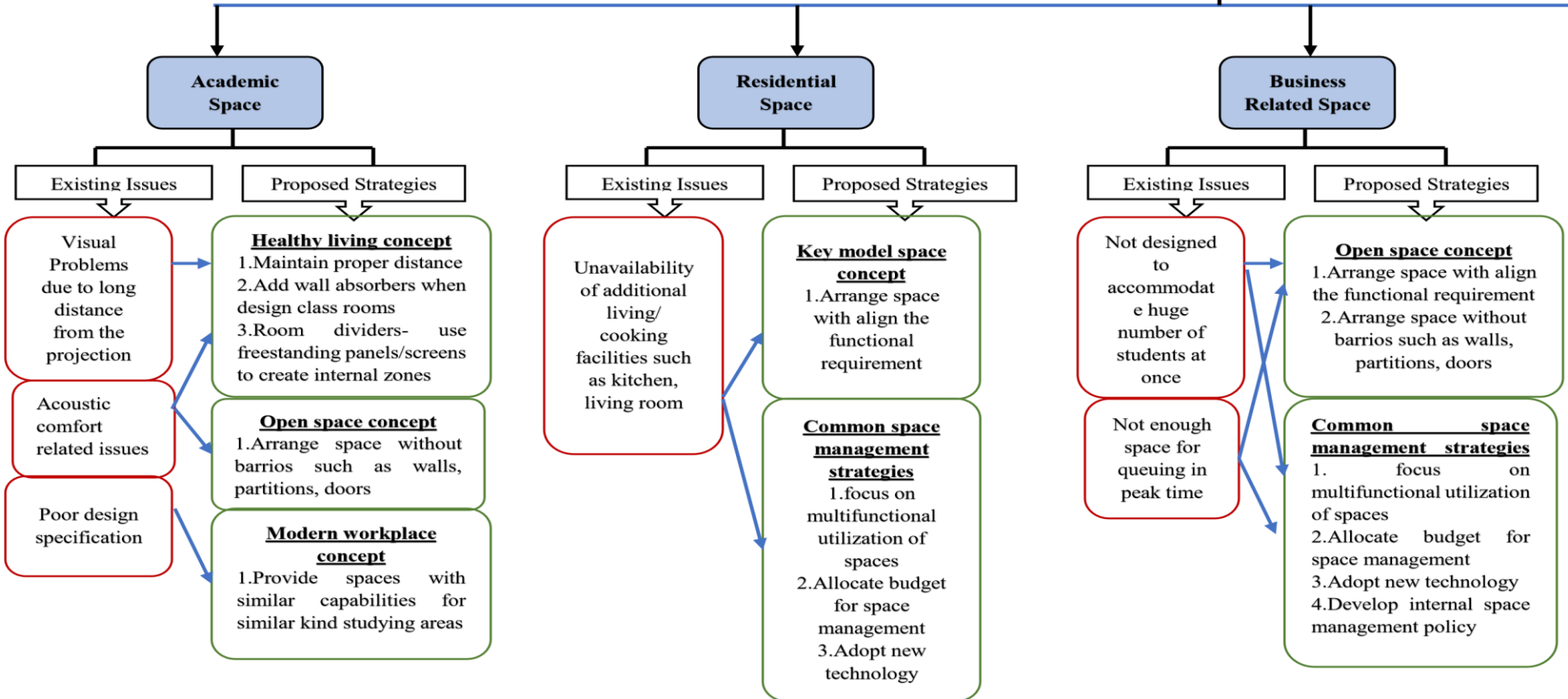**Administration Space**

Existing Issues

Proposed Strategies

Space allocation is not aligning with functional requirement

**Healthy living concept**
1. Maintain proper walking distance
2. Room dividers- use freestanding panels/screens to create internal zones

**Key model space concept**
1. Arrange space with align the functional requirement
2. Use four model categories (Hive, Den, Cell, Club) for space planning

**Common space management strategies**
1. focus on multifunctional utilization of spaces
2. Improve management involvement

**Infrastructure Space**

Existing Issues

Proposed Strategies

Not having car/bike parking separately

Insufficient spaces within parking slot

Not having Space for student parking

Lack of space between urinals

Not having enough space in washroom

Not having separate space for disabled persons

**Common space management strategies**
1. focus on multifunctional utilization of spaces
2. Allocate budget for space management
3. Adopt new technology
4. Develop internal space management policy
5. construct flexible structures
6. Provide separate car/bike parking with consisting spaces

**Healthy living concept**
1. Adjust the adequate walking space and walking distance from parking to facility

**Modern workplace concept**
1. Allocate space without assign students and staff

**Universal design concept**
1. comply with legal regulations and standards
Ex: Sri Lanka Disability Act
2. Arrange separate spaces for disable persons

**Retail and Leisure Space**

Existing Issues

Proposed Strategies

Unavailability of enough retail and leisure space

Not enough space for different sports in playground and gymnasium

**Common space management strategies**
1. focus on multifunctional utilization of spaces
2. Allocate budget for space management
3. Adopt new technology
4. Develop internal space management policy
5. construct flexible structures

**Healthy living concept**
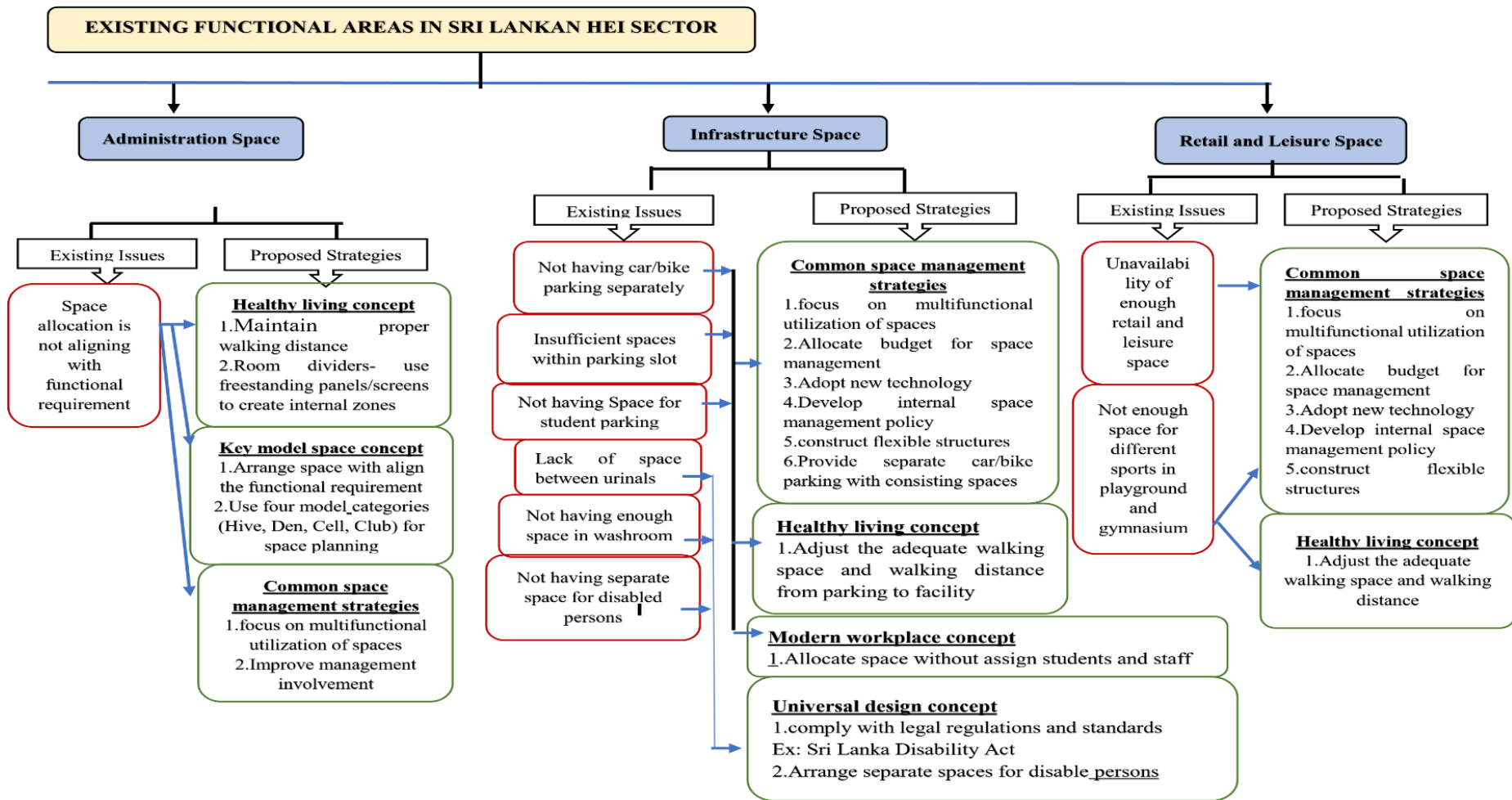1. Adjust the adequate walking space and walking distance

Figure 3 : Different Functional Areas SM Issues and Suitable SM Concepts and Strategies(Continued)

# 5. Conclusion

SM has significant impact on success of core business in Sri Lankan HEI's sector. Existing SM issues in different functional areas of HEI's are disturbed to achieve expectation level of core business in Sri Lankan HEI's sector. Lack of moving space, poor furniture arrangement, poor space allocation within building and poor space allocation for staircases are common issues in Sri Lankan HEI's sector. In addition, different specific SM issues in different functional areas in HEI's sector are determined through this study. FM has a significant role to provide suitable strategies to manage space in HEI in order to overcome the existing issues in Sri Lankan HEI. Therefore, suitable SM strategies and concepts such as healthy living, open space, key model space, modern workplace, universal design and common SM from FM perspective to overcome the existing SM issues in Sri Lankan HEI sector were given in order to investigate the impact of SM to core business of Sri Lankan HEI's sector.

# 6. References

Calvo-Sotelo, P. C., 2010. The concept of "Educational Campus" and its application in Spanish universities. *CELE Exchange, Centre for Effective Learning Environments,* pp. 1-7.

Daigneau, W. A. et al., 2005. Planning, designing and managing higher education institutions. *PEB Exchange, Programme on Educational Building.*

Den Heijer, A., 2012. Managing the university campus: Exploring models for the future and supporting today's decisions. *CELE Exchange,* Volume 2.

Glass, A., ed., 2014. *The state of higher education.* s.l.:The OECD Higher Education Programme (IMHE).

Hanan, H., 2013. Open space as meaningful place for students in ITB campus. *Procedia - Social and Behavioral Sciences,* Volume 85, pp. 308-317.

Hashim, A., Baharum, Z. & Aziz, A., 2013. *Space inventory management in the Malaysian public universities.* Hanoi, Vietnam, s.n., pp. 246-257.

Ibrahim, I., Yusoff, W. Z. W. & Sidi, N. S. S., 2011. *A comparative study on elements of space management in facilities management at higher education institutions.* Kuala Lumpur, s.n.

IFMA, 2019. *International Facilities Management Association.* [Online]
Available at: https://www.ifma.org/about/what-is-facility-management

JICA, 2004 . *Approaches for systematic planning of development projects: effective approaches for higher education,* s.l.: Japan International Cooperation Agency.

Jylhä, V. P. T., 2015. The perceived value of workplace concepts for organisations. *Journal of Corporate Real Estate,* 17(4), pp. 260-281.

Kaya, S. et al., 2005. Raising facilities management's profile in organisations: Developing a world-class framework. *Journal of facilities management,* 3(1), pp. 65-82.

Li, L. et al., 2017. Exploring space management goals in institutional care facilities in china. *Journal of Healthcare Engineering,* Volume 2017, pp. 1-15.

Ministry of Education, 2013. *Education first Sri Lanka.* s.l.:Sisara Printway Private Limited.

Nik-Mat, N., Kamaruzzaman, S. & Pitt, M., 2011. Assessing the maintenance aspect of facilities management through a performance measurement system: A Malaysian case study. *Procedia Engineering,* Volume 20, pp. 329-338.

Oluwoye, J. & Ilozer, B., 1998. Open-plan measures determine facilities space management. *Facilities,* 16(9/10), pp. 271-279.

Palys, T., 2008. Purposive sampling. *The Sage Encyclopedia of Qualitative Research Methods,* Volume 2, pp. 697-8.

Pitt, M. & Tucker, M., 2008. Performance measurement in facilities management: driving innovation?. *Property Management,* 6(4), pp. 241-254.

Ropo, A., Salovaara, P., Sauer, E. & Paoli, D. D. eds., 2015. *Leadership in Spaces and Places.* Chelthenham: Edward Elgar.

Shahabudin, A. et al., 2012. *Classroom management: Measuring space usage.* s.l., s.n., pp. 931-936.

Silva, N. D., 2011. Promoting the facilities management profession in the project development phase of high-rise buildings in Sri Lanka. *Built-Environment Sri Lanka,* 9(1-2), pp. 37-44.

University Grants Commission, 2013. *Strategic management plan,* Colombo: Govenment Publication.

Ushantha, R. A. C. & Kumara, P. A. P. S., 2016. A quest for service quality in higher education: empirical evidence from Sri Lanka. *Services Marketing Quarterly,* 37(2), pp. 98-108.

Xia, J., 2004. Library space management: A GIS proposal. *Library Hi Tech,* 22(4), pp. 375-382.