New Design Ideas
Vol.6, No.1, 2022, pp.51-70

INTERIOR DESIGN PROJECT MANAGEMENT PROCESSES AND ITS RELATIONSHIP WITH PROJECT SUCCESS

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Abstract. Project management is important in interior design particularly between the planning and implementation phases to ensure successful completion of projects. There are numerous studies with regards to design theories, education and profession but little has been found on interior design management. Therefore, the aim of this research was to study the implementation of project management processes in interior design projects and its relationship to project success. Based on literature review, a pre-determined project management framework was tested on its relationship with project success in interior design firms in Malaysia through a questionnaire survey. The study was concluded by determining how comprehensively project management processes are practiced in Malaysia and how its proper implementation influences the success of interior design projects.

Keywords: *Interior design, design processes, project management.*

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Received: *16 October 2021;* ***Accepted:*** *12 February 2022;* ***Published:*** *28 April 2022.*

1. Introduction

As the interior designer's core business encompasses the design, construction as well as the management of the project, it is imperative for them to obtain the knowledge and understand project management processes, technical knowledge and systems of work to deliver and complete projects successfully (Mustapha *et al.,* 2013). Suresh and Sivakumar (2019) state that effective project management will aid in upholding and managing coordination works, planning the overall work process, completion of tasks in a timely manner and in achieving the goals and objectives of the organization. Notwithstanding this, project management competency is still lacking and disregarded during practice. Looking at the construction industry as a whole, many persistent issues are directly or indirectly, related to unsatisfactory designs, design processes as well as how design management is practiced and these problems have contributed extensively to project time and cost overruns besides the more serious building and infrastructure failures (Pikas *et al.,* 2020).

Issues with relation to interior design projects include the management of projects, lack of efficiency and accuracy in progress monitoring (Roh *et al.*, 2011), unrealistic understanding of detailing works as well as complexities with relation to interior works (Ekanayake *et al*., 2021), deficiency of a standard indoor construction work system as well as low accuracy and efficiency in terms of quantitative measurements and calculations, material wastage and reduced environmental protection due to technical defects (Li & Liu, 2018), potential deviations from planned schedule or unexpected events that often times lead to unexpected financial disadvantages (Kropp *et al*., 2018), the inability to determine the economic viability of projects with relation to project concept (Conconi & Pandolfi, 2018), overlapping scope of works with other consultants, mistakes in justification and scope of work that lacks clarity and detail (Mustapha et al., 2013; Jasmani, 2016), difficulties of communications and potentialities in the management of interior design projects (He *et al*., 2019) and lastly, some organizations that are not updated with current technological needs due to financial constraints, a lack of knowledge as well as readiness and awareness level (Abd-Hamid & Embi, 2020).

The issues mentioned above justify the need to conduct a study on the importance and use of project management by interior designers to increase project success since most of the issues stated are highly associated with the management of projects in some way. Additionally, existing literature shows insufficient documented knowledge and information with relation to the implementation of project management in interior design projects. Therefore, this research will focus on studying the influence of project management processes on contributing to the quality of the end-product, satisfaction of clients and end-users as well as completion within time and cost thus, contributing to overall project success.

2. Project management (PM) process framework in interior design projects

Clevenger and Haymaker (2011) define design process as "implementation of a strategy to a challenge resulting in an exploration" ideally made of three (3) elements namely, challenge, strategy and exploration. The Council for Interior Design Qualification, CIDQ (2019) defined the widely accepted phases of the interior design process as Programming, Schematic Design, Design Development, Contract Documentation and Contract Administration. The council further lists the tasks that the practice and management of an interior design project may involve. These include: (1) Project management; (2) Project goals which involves the understanding and documentation of the client's and stakeholders' goals and objectives with reference to the project (project scope management); (3) Data collection in order to maximize design outcomes and stakeholder satisfaction, evaluation and assessment of existing site conditions; (4) Design conceptualization; (5)Selection of materials, furniture, fitting and equipment (FF&E); (6) Documentation that involves contracts and permits as well as documentation of design by phases of schematic, design development as well as construction drawings and specifications; (7) Coordination of other consultants such architects, engineers and other specialty consultants; (8) Contract administration that involves the tasks of distribution and bid analysis, the administration of construction, review and pay-outs of contractors, assessment of shop drawings and other relevant documents and drawings, site visits and work progress reports and lastly, project close-out; and (9) Pre-Design and Post-Design Services which are used to measure the success of the project with reference to client or stakeholder's expectations and goals. Therefore,

it is obvious that project management knowledge is crucial for interior designers to successfully complete a project as most of the stages and processes involved in a typical interior design project involves management skills besides the creative aspect. While the overall design outcome may be the priority on the stakeholders' goals and objectives, aspects such as budget, schedule, quality and resource management amongst others play an imperative part in the determination of the success of a project. However, while CIDQ (2019) broadly described the phases involved in an in a typical interior design project, there was no elaboration on the processes involved in each relevant phase.

On the other hand, the British Institute of Interior Design (BIID) suggests the RIBA Plan of Work to be an excellent resource for interior designers as it provides a valuable insight on a project's workflow right from the beginning to the end (British Institute of Interior Design, 2021). Hughes (2003) states that the RIBA Plan of Work originated beginning with numerous authors attempting to map out the processes inherent in design, during early researches about design methods and finally, it was initiated in 1963 as a framework for architects to implement on projects with their clients which in return brought greater clarity to the different stages of a project. The RIBA Plan of Work consists of eight stages of which its culmination acts to notify the brief, design, construction, handover and use of a building (RIBA, 2020). The eight stages as documented in the RIBA Plan of Work along with the details of processes involved in each stage of the project is summarized in Table 1 below.

Table 1. Project management processes by stages (Adapted from: RIBA, 2020)

Stage	Process
Strategic Definition	Preparation of client requirements
	Development of business case for feasible options including review of project risks and project budgets
	Confirmation of option that best delivers client requirements
	Review of feedback from previous projects
	Site appraisal
Preparation and Briefing	Preparation of project brief including project outcomes and sustainability outcomes, quality aspirations and spatial requirements
	Feasibility studies
	Confirmation on project budget
	Sourcing of site information including site surveys
	Preparation of project program
	Preparation of project execution plan
	Preparation of responsibility matrix
Concept Design	Preparation of design concept incorporating relevant requirements in alignment to cost plan, project strategies and outline specification
	Agreement on potential changes in project brief
	Design reviews with client and project stakeholders
	Preparation of design program

Spatial Coordination	Undertake design studies, engineering analysis (if any) and cost exercises to test design concept
	Completion of spatially coordinated design aligned to updated cost plan, project strategies and outline specification
	Initiation of change control procedures
	Review of design against building regulations or any other authority requirements
Technical Design	Development of technical design and drawings
	Preparation and coordination with design team on Building Systems Information
	Preparation and integration of specialist/ subcontractor Building Systems Information as part of final specification
	Preparation of construction program
Manufacturing and Construction	Finalisation of site logistics
	Manufacturing of building systems and commencement of construction
	Monitoring progress against construction program
	Inspection of construction quality
	Resolve site queries as required
	Undertake commissioning of project
	Preparation of defects list
	Preparation of building / operational manual (including health and safety file and fire safety information)
Handover	Hand over building in line with Plan for Use Strategy
	Review of project performance
	Seasonal commissioning as required
	Rectification of defects
Use	Appointment of facilities management and asset management teams, and strategic advisers as needed
	Implementation of facilities management and asset management
	Post occupancy evaluation of building performance in use
	Verification of project outcomes

Similarly, according to Noorhani et al. (2014), interior design projects are like any project in the construction industry whereby the scope of the interior designer involves processes such as feasibility study, design, tendering, construction and maintenance in sequence. An entire interior design project, therefore, encompasses design and project management besides construction and site management during the construction phase of the project. The findings of Noorhani et al. (2014) was found to be comparable to the RIBA Plan of Work. Lastly, with reference to the Architect's Act 1967 (Act 117) & Rules, the interior designer's responsibilities include coordination of consultant's work, inspection of works and estimates of cost and time amongst others which makes the interior designer's job scope not just limited to designing.

In summary, the stages or phases of a project as described by The National Council for Interior Design Qualification, NCIDQ (2019), the RIBA Plan of Work, Noorhani et al. (2014) as well as the Architect's Act 1967 (Act 117) & Rules were found to be comparable although some terms used in labelling each stage were distinct. While all sources described the stages of a project, the RIBA Plan of Work clearly set out the tasks to be undertaken by the design team at each project stage (Sinclair, 2019) and as well as the milestones to be achieved. Therefore, the RIBA Plan of Work was used as a theoretical framework to study the implementation of project management process framework for interior design projects in Malaysia.

3. Project success

According to PMI (2017, p.547), project success can be measured with relevance to the objectives of the project as well as its pre-determined success criteria. A business case is often developed before a project is initiated and it should ideally outline elements like project objectives, the investment required for the project as well as the financial and qualitative criteria that defines project success. Radujković and Sjekavica (2017) differentiates project success from project management success in such a way that project success is said to be linked with the outcome when the overall project goals achievement is evaluated, whereas the traditional measurements of time, cost and quality performance is used to evaluate project management success. On the other hand, Al-Hajj and Zraunig (2018) opine that project success is influenced by various factors that are out of the control of project management therefore, defining project success as dependent on project management success and the success of the end-product whereas Badewi (2016) highlights in measuring project success in the short term, the efficiency of the project is used while when measuring project success in the medium and long term, the project's effectiveness in achieving the expected result is used.

Davis (2017) conducted a study to address the gap between the differing views of project success from the eyes of multiple stakeholder groups and found that all stakeholders do not value all project success dimensions with the aim of achieving project success. This implies that different stakeholders perceived project success differently. Similarly, Gomes and Romão (2016) highlighted that various stakeholders involved in a project tend to have different perceptions of project success, however, while there may be various perceptions in the definition of project success, numerous authors agree on using the triple constraint of cost, time and quality in determining and defining the achievement of a project's objectives. Furthermore, Albert, Balve and Spang (2017) stated that the criteria of time, cost and performance have expanded over time and specifically criteria that focus on stakeholder satisfaction have become more prominent in recent times thus, concluding that there is no single, common definition for the term project success.

With reference to PMI (2017, p. 34), the success of a project should be measured based on the achievement of project objectives as the stakeholders of a project may have different perspectives on what is considered as a successfully completed project and which of those factors are considered as the most crucial. Dvir, Raz and Shenhar (2003) in their research on the relationship between project planning and project success states that success is typically associated with achieving the project's budget and schedule as well as achieving an acceptable performance level which is like the criteria of the iron triangle. Castro, Bahli, Farias Filho, and Barcaui (2019) on the other hand, conducted an

extensive literature review to study the various perspectives on the topic of project success hence, arriving at a conclusion that there was an overlap of success dimensions even when the project contexts were different. The authors concluded that project efficiency, benefits for the organization and for stakeholders, business success, and end-user's satisfaction were the widely accepted dimensions.

Furthermore, Suresh and Sivakumar (2019) suggest that project management effectiveness measures the extent to which the project goals and objectives have been accomplished. They also add that a project is considered effective when the full satisfaction of the users is achieved by meeting all the objectives of the project and all designated interests of the project such as sponsors and initiators who accept the results of the project and hence close the project officially. In their study, Suresh and Sivakumar (2019) identified five (5) factors that affect project management effectiveness which include; (1) the life cycle of the project, (2) clear definition of roles and responsibilities, (3) management of time, (4) economic factors and (5) risk.

Finally, Demirkesen and Ozorhon (2017) who studied the impact of integration management on the performance of construction project management highlighted that elements such as time, cost, quality, safety and client satisfaction form the dimensions of project management performance. Their research measured project management performance using indicators of whether the projects surveyed were completed within schedule, within budget, achieved the required quality, achieved the required safety and if it satisfied the client's requirement. Similarly, Wu, Liu, Zhao and Zuo (2017) highlighted that project success comprises of hard indicators such as quality, cost, schedule, safety, as well as soft indicators such as project stakeholders' satisfaction, efficiency and effectiveness of project management.

In conclusion, traditionally the success of a project has been measured based on the iron triangle of cost, time and quality. Meeting there these (3) criteria was adequate to say that the project is a success. However, as pointed out by numerous other authors overall project success is a much wider concept as compared to the traditional 'iron triangle' of project efficiency. The definition of project success has become wider with the inclusion of additional elements of the project such as "client satisfaction, realization of customer objectives, end-user's satisfaction, and the satisfaction of other groups of stakeholders" (Gomes & Romão, 2016). As stated in PMI (2017), the success rate of a project should be measured against the achievement of project goals and objectives making the measurement of project success specific to each project. Thus, in considering all of the literature reviewed, the criteria that was used in this study to measure project success and project performance included project efficiency (schedule and budget), health and safety, quality, functionality, client / end-user's satisfaction, design team's satisfaction and construction team's satisfaction.

4. Methodology

In the case of this research, the quantitative method was selected as the research is designed in a manner where a theoretical framework is developed based on the findings in literature and hence it is tested and verified based on relevant data that is collected. Quantitative data will be required to deduce possible reasons that explain the relationships between the variables identified in this study. Hence, this study used the questionnaire method for data collection in which every respondent was required to respond to a same set of questions that was in a predetermined order. The target group of the questionnaire

were professionals and individuals who were involved in interior design projects, specifically in the design and implementation stages. After determining the population size (601 interior designers) and its corresponding sample size (234 samples) based on Krejcie and Morgan's table for determining sample size from a given population, the questionnaire was distributed to the selected participants via email and social networking sites such as LinkedIn and Instagram.

The analysis of the data collected for this study has been analysed using the statistical package for social science (SPSS) software. The data collected from the questionnaire was analysed using descriptive statistics (percentage and average mean) in sections where characteristics of the dataset only required to be described and inferential statistics (correlation analysis) where the data collected was analysed to determine the relationship between two variables and used to make predictions and generalizations about the larger dataset.

This study was limited to the interior design professionals based in the main cities of Peninsular Malaysia. Therefore, it is recommended that future research is conducted with the inclusion of professionals from all states in order to get a better and clearer perspective. Besides that, some of the respondents of this study mentioned that their management approach of projects varied depending on the scale of the project while this study only focusses on the overall management of projects. Future research can take into consideration the scale pf projects when studying interior design project management processes and its relationship with project success.

5. Results and discussion

According to the sample size identified, a total of 234 surveys were sent out through emails and social networking sites such as LinkedIn and Instagram. The final response rate was 36.75% (86 respondents). The response rate is considered acceptable by benchmarking it with similar previous studies by Demirkesen and Ozorhon (2017) that achieved a response rate of 24% and Ismail (2016) that achieved a response rate of 14.2%. Details of the respondents with reference to their nature of business are presented in the Table 2 below. There was participation from respondents who were from a variety of backgrounds with different work experience and types of projects worked on which enabled the generalization of findings towards the interior design industry in Malaysia.

Table 2. Details of respondents

Nature of Business	**Frequency (Number of respondents)**	**Percentage (%)**
Interior Design Consultancy	19	22.1
Interior Design & Build	52	60.5
Interior Design Contractor	10	11.6
Interior Product Supplier	3	3.5
Interior Architecture Consultancy	2	2.3
Total	**86**	**100.0**

The reliability of the questionnaire was measured by testing its consistency with the Cronbach's alpha test in SPSS. The Cronbach's coefficient alpha statistic is commonly used to measure and indicate the reliability of tests and scales (questionnaire) that have been used in the study is fit for purpose. The analysis is done by indicating that the same response pattern is shown by the subjects over the course of the questionnaire while also demonstrating the extent of correlation between items. Therefore, Cronbach's alpha is used to demonstrate that a certain questionnaire, test or scale that has been constructed for a research study is fit for its purpose. The resulting alpha coefficient of reliability is measured between 0 to 1 in providing this overall assessment of a measure's reliability. The table below shows the reliability test of the questionnaire survey in this research.

Table 3. Reliability analysis using Cronbach's alpha value

Question	Cronbanch's alpha value
Presence of Project Management	0.941
Project Performance	

6. Presence of project management in interior design projects in Malaysia

The presence of project management processes and its frequency as practiced in interior design organizations in Malaysia was tested by asking respondents to select answers that best reflect the current project management practices in their organization. These included evaluating aspects of project planning and monitoring, stakeholder involvement and interior design work development process as practiced in their respective companies.

Most of the respondents (48.8%) planned in detail during the early stages of the project and then revised the project plan if required. This signifies that most of the respondents defined the basis of all project work and the way they will be performed at the early stages of the project, which as stated by Freitas, Silva, Campilho, Pimentel, and Godina (2020) is a traditional predictive project management approach that involves planning everything in upfront and then controlling and adjusting when needed, throughout the course of the project timeline. Additionally, Noorhani and Mustapha (2021) highlighted that a thorough project plan should be prepared, its progress tracked efficiently and communicated with the relevant stakeholders as a failure to do so may result in schedule delays and budgetary setbacks. Meanwhile, 23.3% of respondents planned in macro in the early stages of the project then detailed their planning in each phase of the project, while 25.6% of the respondents developed their project plan by iteration. These approaches are like the more pared-down, focused approach at the beginning of the project, combined with the flexibility to revise as the project progresses as suggested by Sicotte and Delerue (2021). Two (2) respondents did not select the options given but instead responded that their project planning approach depended on the complexity of the project as small scaled and short termed projects did not require developing a detailed project network.

In the case of project planning responsibility, the results showed that most of the respondents (38.4%) stated that project planning was a shared responsibility between project team members. This signifies that there is no one person who is responsible for the project planning. This is followed by Project Designer (26.7%), Project Manager

(24.4%) and Project management office (PMO) / department (10.5%). Where project monitoring responsibility is concerned, the Project Manager was mostly shown to be the person in charge with 31.4%. This is followed by a shared responsibility between project team members (30.2%), Project Designer (24.4%) and Project management office (PMO) / department (14.0%). 23 respondents stated that the Project Designer is responsible for the project planning while 21 respondents stated that the Project Designer was responsible for project monitoring, therefore, supporting the findings of Noorhani and Mustapha (2021) that project management skills as well as design skills are both required for interior designers to carry out their projects effectively.

Most of the respondents had stakeholders involved in all project phases (43.0%). However, the rest of the respondents stated that stakeholders were only involved in certain phases of the project which amounts to 57.0%, out of which only 1.2% responded that stakeholders were involved in the planning phase. This signifies that over half of the interior design professionals in Malaysia did not involve all stakeholders in all phases of the project. de Oliveira and Rabechini Jr (2019) highlights that it would be difficult to achieve the objectives of the project without participation of people either directly or indirectly as a project is typically a social activity where the establishment of relationships, communication and leadership are important. Besides that, Srinivasan and Dhivya (2020) state that positive commitment between various stakeholders and team members involved in a project can be created through adequate stakeholder participation thus enabling project success whilst increasing performance. Also, Lundmark (2020) highlights that in design and development projects, stakeholder participation provides information to the design as the user's perspective is considered. This signifies that stakeholder involvement is crucial in ensuring better project efficiency and ultimately project success.

After an extensive literature review the RIBA Plan of Work was decided to be used as a theoretical framework to study the implementation of the project management process framework for interior design projects in Malaysia. The RIBA Plan of Work consists of eight stages starting from Strategic Definition up to Use. Respondents were asked to rate the interior design work development process (project management process framework) as practiced in their respective organizations using a Likert scale of; 1=Never, 2=Rarely, 3=Occasionally / Sometimes, 4=Almost every time, 5=Frequently.

Table 4 below presents the findings on the implementation of interior design work development process that is representative of the interior design industry in Malaysia. The mean value for the processes in all the stages of the projects fell between 3.33 (lowest mean value) and 4.43 (highest mean value) which signifies that project management processes were being practiced *Occasionally / Sometimes* to *Almost every time*. Project stages 1: Strategic Definition, 3: Concept Design, 5: Technical Design and 6: Manufacturing and Construction indicate that over 50% of the processes in each of these stages has mean values of more than 4.00 which shows that these processes are practiced *almost every time*. Meanwhile, project stage 8: Use recorded the least mean values of overall. This indicates that project management processes in this stage of the project were the least practiced as compared to the other stages. In summary, in can be concluded that project management processes in interior design projects was not comprehensively practice in Malaysia.

Table 4. Interior design project management process framework

Stage	Process	Mean Score	Std. Deviation
1: Strategic Definition	Preparation of client requirements	4.43	0.712
	Development of business case for feasible options including review of project risks and project budgets	3.91	0.806
	Confirmation of option that best delivers client requirements	4.30	0.798
	Review of feedback from previous projects	3.92	1.008
	Site appraisal	4.06	0.817
2: Preparation and Briefing	Preparation of project brief including project outcomes and sustainability outcomes, quality aspirations and spatial requirements	3.95	0.880
	Feasibility studies	3.74	0.910
	Confirmation on project budget	4.09	0.849
	Sourcing of site information including site surveys	4.06	0.886
	Preparation of project program	3.83	0.996
	Preparation of project execution plan	3.84	1.039
	Preparation of responsibility matrix	3.67	1.132
3: Concept Design	Preparation of design concept incorporating relevant requirements in alignment to cost plan, project strategies and outline specification	4.26	0.723
	Agreement on potential changes in project brief	3.97	0.860
	Design reviews with client and project stakeholders	4.36	0.766
	Preparation of design program	4.17	0.870
4: Spatial Coordination	Undertake design studies, engineering analysis (if any) and cost exercises to test design concept	3.63	0.971
	Completion of spatially coordinated design aligned to updated cost plan, project strategies and outline specification	3.94	0.899
	Initiation of change control procedures	3.87	0.918
	Review of design against building regulations or any other authority requirements	4.01	0.914
5: Technical Design	Development of technical design and drawings	4.27	0.726
	Preparation and coordination with design team on Building Systems Information	4.05	0.839
	Preparation and integration of specialist/ subcontractor Building Systems Information as part of final specification	4.03	0.789
	Preparation of construction program	3.98	0.907

6: Manufacturing and Construction	**Finalisation of site logistics**	**3.76**	**0.957**
	Manufacturing of building systems and commencement of construction	3.71	0.919
	Monitoring progress against construction program	4.07	0.794
	Inspection of construction quality	4.19	0.805
	Resolve site queries as required	4.17	0.843
	Undertake commissioning of project	3.76	0.981
	Preparation of defects list	4.10	0.868
	Preparation of building / operational manual (including health and safety file and fire safety information)	3.65	1.156
7: Handover	Hand over building in line with Plan for Use Strategy	3.95	0.944
	Review of project performance	3.87	0.980
	Seasonal commissioning as required	3.70	0.946
	Rectification of defects	4.19	0.833
8: Use	Appointment of facilities management and asset management teams, and strategic advisers as needed	3.33	1.173
	Implementation of facilities management and asset management	3.35	1.156
	Post occupancy evaluation of building performance in use	3.48	1.049
	Verification of project outcomes	3.69	1.109
	Update of building manual (including as-built drawings)	3.67	1.111

7. Interior design project performance in Malaysia

To find out the project performance of the respondents' projects, KPI's of project success was used as the tool to measure the performance of projects. Respondents were required to rate their project performance using a Likert scale of; 1=Poor, 2=Fair, 3=Good, 4=Very Good, 5=Excellent. Table 5 below presents the findings on the performance of interior design projects in the context of Malaysia. *Project Efficiency (Cost and Schedule)* recorded the lowest mean score which signifies that projects performed the least well in this aspect as compared to the rest. This supports the findings of Roh et al. (2011), Ismail (2016) as well as Kropp et al. (2018) that schedule, cost overruns and progress monitoring were issues faced in managing interior design projects. *Quality*, *Functionality* and *Client / End-user's satisfaction* recorded mean score above 4.00 which showed that project performed *Very Good* in these aspects.

Table 5. Interior design project performance in Malaysia

Criteria	Mean Score	Std. Deviation
Project Efficiency (Cost and Schedule)	3.87	0.720
Health and safety	3.93	0.837
Quality	4.03	0.758
Functionality	4.13	0.748
Client / End-user's satisfaction	4.20	0.764
Design team's satisfaction	3.93	0.865
Construction team's satisfaction	3.95	0.893

8. The relationship between interior design project management processes and project success

A correlation analysis was carried out to test the relationship between the implementation of the project management processes in interior design projects and its relationship with project success as shown in Table 6 below. As both the variables to be tested were ordinal, the Spearman's rho correlation coefficient was used where the value r = 1 means a perfect positive correlation and the value r = -1 means a perfect negative correlation. The rule of thumb for interpreting Spearman's correlation value as suggested by Pallant (2011) was used to interpret the relationship between the variables. The level of significance is expressed as p-value, and a p-value of less than 0.05 (typically ≤ 0.05) is statistically significant where this indicates strong evidence against the null hypothesis, as it shows a less than 5% probability that the null hypothesis is correct.

$H1_a$: There is a statistical relationship between the implementation of project management processes in interior design projects and project success.

$H1_0$: There is no statistical relationship between the implementation of project management processes in interior design projects and project success.

Hypothesis 1 was tested to establish if there was an association between the implementation of project management processes in interior design projects and project success. The Spearman Rho correlation results are shown in 6 below, where H10 (null hypothesis) was rejected at $p<0.05$ level of significance. The results showed a medium correlation between most of the project management process variables and project success variables.

Table 6. Correlation coefficient tested between the implementation of project management processes in interior design projects and project success

Project Success Measure / Project Management Process in ID projects	**Project Efficiency (Cost and Schedule)**	**Health and safety**	**Quality**	**Functionality**	**Client / End-user's satisfaction**	**Design team's satisfaction**	**Construction team's satisfaction**
1: Strategic Definition							
Preparation of client requirements	.344	.109	.347	.509	.498	.388	.416
Development of business case for feasible options including review of project risks and project budgets	.297	.283	.341	.371	.256	.247	.276
Confirmation of option that best delivers client requirements	.446	.305	.336	.571	.484	.411	.457
Review of feedback from previous projects	.269	.150	.212	.342	.268	.291	.239
Site appraisal	.427	.249	.378	.456	.494	.412	.418
2: Preparation and Briefing							
Preparation of project brief including project outcomes and sustainability outcomes, quality aspirations and spatial requirements	.277	.184	.226	.411	.338	.280	.271
Feasibility studies	.327	.163	.290	.443	.404	.347	.363
Confirmation on project budget	.317	.222	.223	.374	.342	.212	.205
Sourcing of site information including site surveys	.408	.259	.310	.506	.475	.448	.488
Preparation of project program	.324	.147	.232	.356	.381	.361	.439
Preparation of project execution plan	.296	0.203	.288	.431	.410	.399	.457
Preparation of responsibility matrix	.303	.189	.227	.368	.310	.339	.419
3: Concept Design							
Preparation of design concept incorporating relevant requirements in alignment to cost plan, project strategies and outline specification	.353	.214	.234	.433	.394	.273	.268
Agreement on potential changes in project brief	.155	.154	.121	.296	.193	.108	.139

Design reviews with client and project stakeholders	.368	.359	.291	.508	.369	.137	.083
Preparation of design program	.191	.220	.209	.434	.266	.183	.177
4: Spatial Coordination							
Undertake design studies, engineering analysis (if any) and cost exercises to test design concept	.171	.177	.133	.203	.203	.202	.211
Completion of spatially coordinated design aligned to updated cost plan, project strategies and outline specification	.152	.215	.082	.247	.198	.139	.193
Initiation of change control procedures	.201	.265	.166	.377	.150	.137	.142
Review of design against building regulations or any other authority requirements	.278	.229	.172	.410	.225	.247	.262
5: Technical Design							
Development of technical design and drawings	**.224**	**.084**	**.074**	**.297**	**.270**	**.168**	**.173**
Preparation and coordination with design team on Building Systems Information	.289	.158	.155	.289	.322	.208	.201
Preparation and integration of specialist/ subcontractor Building Systems Information as part of final specification	.222	.192	.131	.336	.263	.200	.227
Preparation of construction program	.338	.239	.237	.413	.376	.299	.277
6: Manufacturing and Construction							
Finalisation of site logistics	.470	.307	.303	.419	.448	.331	.284
Manufacturing of building systems and commencement of construction	.465	.345	.295	.457	.354	.359	.340
Monitoring progress against construction program	.318	.228	.198	.244	.377	.277	.409
Inspection of construction quality	.399	.346	.287	.448	.482	.314	.396
Resolve site queries as required	.262	.251	.235	.431	.323	.220	.235
Undertake commissioning of project	.487	.457	.439	.478	.412	.403	.412
Preparation of defects list	.215	.237	.114	.319	.244	.223	.175

Preparation of building / operational manual (including health and safety file and fire safety information)	.387	.307	.274	.343	.349	.351	.269
7: Handover							
Hand over building in line with Plan for Use Strategy	.351	.297	.173	.419	.233	.278	.259
Review of project performance	.372	.345	.343	.491	.386	.442	.300
Seasonal commissioning as required	.391	.350	.284	.361	.375	.477	.440
Rectification of defects	.320	.198	.186	.424	.357	.333	.274
8: Use							
Appointment of facilities management and asset management teams, and strategic advisers as needed	.259	.256	.170	.177	.213	.175	.161
Implementation of facilities management and asset management	.250	.214	.154	.208	.148	.145	.137
Post occupancy evaluation of building performance in use	.188	.249	.186	.174	.162	.154	.133
Verification of project outcomes	.245	.362	.202	.225	.251	.165	.132
Update of building manual (including as-built drawings)	.183	.311	.170	.208	.128	.070	.020

$H2_a$: There is a statistical relationship between the implementation of project management processes during the *Strategic Definition Stage* and project success.

$H2_0$: There is no statistical relationship between the implementation of project management processes during the *Strategic Definition Stage* and project success.

$H3_a$: There is a statistical relationship between the implementation of project management processes during the *Preparation and Briefing Stage* and project success.

$H3_0$: There is no statistical relationship between the implementation of project management processes during the *Preparation and Briefing Stage* and project success.

$H4_a$: There is a statistical relationship between the implementation of project management processes during the *Concept Design Stage* and project success.

$H4_0$: There is no statistical relationship between the implementation of project management processes during the *Concept Design Stage* and project success.

$H5_a$: There is a statistical relationship between the implementation of project management processes during the *Spatial Coordination Stage* and project success.

$H5_0$: There is no statistical relationship between the implementation of project management processes during the *Spatial Coordination Stage* and project success.

$H6_a$: There is a statistical relationship between the implementation of project management processes during the *Technical Design Stage* and project success.

$H6_0$: There is no statistical relationship between the implementation of project management processes during the *Technical Design Stage* and project success.

$H7_a$: There is a statistical relationship between the implementation of project management processes during the *Manufacturing and Construction Stage* and project success.

$H7_0$: There is no statistical relationship between the implementation of project management processes during the *Manufacturing and Construction Stage* and project success.

$H8_a$: There is a statistical relationship between the implementation of project management processes during the *Handover Stage* and project success.

$H8_0$: There is no statistical relationship between the implementation of project management processes during the *Handover Stage* and project success.

$H9_a$: There is a statistical relationship between the implementation of project management processes during the *Use Stage* and project success.

$H9_0$: There is no statistical relationship between the implementation of project management processes during the *Use Stage* and project success.

Referring to Table 6, null hypotheses $H5_0$ and $H9_0$ failed to be rejected at at $p<0.05$ level of significance as the correlation coefficent analysis showed no relationship between most of

the variables. On the other hand, null hypotheses $H2_0$, $H3_0$, $H4_0$, $H6_0$, $H7_0$ and $H8_0$ are rejected as most of the variables in *Strategic Definition Stage, Preparation and Briefing Stage, Concept Design Stage, Technical Design Stage, Manufacturing and Construction Stage and Handover Stage* has a *significant relationship* with project success. It can be concluded that the implementation of specific project management processes is pertinent in contributing to the quality of the end-product, satisfaction of clients and end-users as well as completion within time and cost hence, contributing to project success in entirety.

Besides that, the results also show that certain project management processes have a *large correlation* with the project success measure of Functionality. With reference to the processes of *Preparation of client requirements* and *Confirmation of option that best delivers client requirements*, an inference can be made that by carrying out these processes diligently, the functionality of the project can be achieved successfully as the success of an interior design project is determined by what extent the user's needs and desires have been met (Karaaslan & Yazıcıoğlu, 2015). Moreover, the *Sourcing of site information including site surveys* is crucial in determining the direction of the design scheme thus enabling a successful design (Shi, 2021). Hong (2012) further adds that it is crucial to carry out a comprehensive interior design survey in order to enable the designing of the space to be carried out effectively, as the interior environment should be designed based on the basis of improving the quality of the living environment. Lastly, *Design reviews with client and project stakeholders* relates to the involvement of stakeholders in the project. de Oliveira and Rabechini Jr (2019) as well as Srinivasan and Dhivya (2020) emphasized on the importance of the coordination of actions for stakeholder engagement and information collection with regards to their insights throughout the course of the project, to ensure project success. Therefore, it can be inferred that reviewing the design with clients and project stakeholders at stipulated intervals allows for a project that is successful in terms of functionality.

Furthermore, the results also show that three (3) project management processes have a *correlation with all the project success measures*. Park-Lee and Person (2018) state that the most obvious manifestation with regards to issues pertaining client requirements involves uncertainties about the scope and outcome of design projects thus resulting in design consultants placing prime attention to establish their scope of work in projects. However, the authors further elaborate that specific phases and design outcomes are often undecided and subject to change. Therefore, it can be inferred that a *confirmation of an option that best delivers client requirements* does correlate to all project success factors. Crowe et al. (2020) state that commissioning is a systematic process of verifying and documenting new and existing building systems if they operate as per design and the client's requirements. Therefore, it can be inferred that *Undertake commissioning of project* correlates to all project success factors as this process is representative of and relates to every aspect of the project. Lastly, *review of project performance* also means that each element of the project must perform according to the client's requirements and therefore this can be measured by all the project success factors as tested in this study.

9. Conclusion

In summary, it is deduced that most of the project management processes correlate to project success measures, therefore proving the importance of project management processes in contributing to the quality of the end-product, satisfaction of clients and end-users as well as completion within time and cost thus, contributing to project success as a whole. However, the results proved that project management processes in interior design projects is not comprehensively practiced in Malaysia. The frequency of implementation of most of the project management processes were ranked as *Occasionally / Sometimes*. Only project stages

1: Strategic Definition, 3: Concept Design, 5: Technical Design and 6: Manufacturing and Construction indicated that over 50% of the processes in each of these stages recorded mean values of more than 4.00 which shows that these processes were practiced *almost every time*.

Besides that, interior design projects in Malaysia were shown to perform the least in terms of Project Efficiency which includes cost and schedule, in comparison to other performance measures. Lastly, this study also found that, the most employed planning approach in interior design projects in Malaysia was the traditional predictive project management approach whereby planning is done in detail in the early stage then revised if required. Most of the respondents (48.8%) planned in detail during the early stages of the project and then revised the project plan if required. Overall, this research has been able to establish the level of implementation of project management processes as practiced in Malaysia.

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