

Added Value of FM Know-how: In the Building Whole Life Process

ABSTRACT

Purpose: This research aims to establish how Facility Management (FM) know-how adds value to optimize a buildings performance and quality over its whole-life and how transition from construction to operation can be improved.

Theories: A framework of theory and best practice in the following key areas was used; perception of value, added value, the design and construction process, life cycle costing, the triple bottom line, transition management and knowledge capture and transfer.

Design/methodology/approach: Mixed methods were used including the creation of two conceptual models (4P life-cycle value measurement), semi-structured interviews and an online questionnaire to explore stakeholder's perceptions of FM and how it can add value in the whole life process. Thematic coding was used to establish key themes and sub-themes of interest from the interviews and SPSS was used to analyse the online questionnaire data. The findings were then triangulated to consider and compare the results.

Originality/value: The findings help contribute to established theory on added value in FM and use the concept of the delta angle of FM know-how as a way to visualize how value can be incrementally added during each phase of the whole-life process. It is of direct and immediate relevance to stakeholders in property, FM and construction and is significant when considering the combined value and size of the construction and FM markets and the potential value that can be delivered to users, society and countries' economies.

Keywords

Facilities management, added value, FM know-how, whole life process

1 INTRODUCTION

The research topic of FM know-how and the added value to a building over its whole-life process originated from the author's own experience of the design and construction process and the transition process to operation. The traditional process often presented a frustrating experience when trying to deliver value to the end users. The field of research associated with added value and FM is increasing. FM can help designers with key decisions, which will have lasting usability, cost efficiency and sustainability impacts over the whole of a buildings life. As such it is worthwhile exploring the role of FM with the whole life and construction process and how FM can add value in the process.

There is now an increasing acceptance of the added value FM know-how brings to ensuring users and building owners achieve the best value and performance from a building over its whole-life. Global economic, social and environmental drivers are all forcing the property, FM and construction sectors to increasingly consider long-term value, rather than simply focusing on short-term returns and the initial capital cost of construction. The importance of FM know-how and its potential to delivery real value to the economy and society has never been greater and FM is now being included in government Corporate Real Estate (CRE) strategies (All Party Parliamentary Group for Excellence in the Built Environment, 2012). Experience in the construction industry has shown that acceptance of the lowest price bid does not provide value for money in both the final cost of construction or the through life and operational costs (Bourn,

2001).

The building industry is the second largest in the world (after agriculture) and buildings contain our lives and all civilization. Office buildings are now the largest capital asset of developed nations and employ over half of their workforce (Brand, 1995). As such achieving a building with a good performance offers the potential for countries to realise real value in economic, environmental and sustainable value terms. It is the relationship between long-term costs and the benefit achieved by clients that represents real value for money” (OGC, 2007). When considering how optimisation of value can be realised, understanding the total cost of ownership and the relative costs of each life phase become critical. For a business case the long-term value over the life of the asset is a much more reliable indicator. Thus a change in paradigm is required from stakeholders involved in the process in order to achieve the best value for users, investors and owners, community and ultimately wider society.

Research by Keller (1995) in Germany considered the ratio of cost between the construction and operation phases of various building types. The exact value of the ratios changes significantly depending on building type but the work showed that in all cases the cost of the maintenance and operation are several times that of the construction. This reflects the now generally accepted principle that the amount spent on buildings, in initial capital and in use, is small compared to the value added by their occupants (Saxon, 2005, p. 1). Further work undertaken by the Royal Academy of Engineering (OGC, 2007) in the UK using an example of a typical office building considered the relative cost ratios for the key phases of; Construction, Maintenance and Operation over a 30 year life cycle and found these to be 1:5:200 leading the UK government to conclude that in order to deliver best value to society and the economy a long-term view needs to be taken.

Many researchers including Hubbuch (2012) have researched the timeline relationship between a buildings operational costs and potential influence on the cost during a buildings whole life. The planning and design phase offers the greatest potential to influence the post-construction life-cycle cost. Up to 80% of the operation cost can be influenced in the first 20% of the design process (ISO, 2008, p. 12). This illustrates why the early involvement of FM Know-how is critical at the early stages when key decisions are being made which will largely define the long-term usability and the life cycle costs (LCC). These decisions will have a direct and lasting impact on future FM functionality and the resulting operational costs and the degree to which they can be optimised in the future (Hubbuch, 2012, p. 3).

The author’s own experience in leading a team of FM experts together with the representatives from the customer, architect, builder and specialists through the initial phases of the design and construction process and the transition to operation led to consideration of the how the potential added value of FM know-how could be measured and how the transition process to operation could be improved to address key FM issues and common problems such as the loss of accumulated knowledge as the design and construction project team disbands at building handover.

2 LITERATURE REVIEW

A theoretical framework of established theories and best practice were reviewed in the development of the two conceptual models and to explore how the value of FM Know-how can be represented and measured in relation to the whole-life process. The following key areas were considered:

Perception of value: The UK Office of Government Commerce Procurement Guide for Whole Life Costing and Cost Management (OGC, 2007) and the Constructing Excellence Be Valuable Report (Saxon, 2005) were used as a reference for understanding perceptions of value using the value equation and the principle of achieving best value.

The added value of FM: The FM Value Map (Jensen, 2009) shows FM primarily as a value adding rather than cost saving discipline, which supports and links the stakeholders' needs with resources, processes, outputs and outcomes. This was used as a frame of reference for thinking about the practical application of FM know-how in terms of value to meet the needs of users and wider society.

Design and construction process: The Swiss SIA 112 Service model (SIA, 2001) and the British Plan of Work for Multi-disciplinary Services (RIBA, 2008) were used as a reference for understanding the different phases of the whole-life of a building and to establish if similar phases are used in different countries. From these models generic phases were used as a frame of reference for the conceptual models.

LCC and FM know-how impact on design decisions: The International Standard ISO 15686-5 on Life-cycle costing (ISO, 2008) and the Swiss IFMA LLC best practice guide and model (IMFA, 2011) and Bringing facilities expertise into the design process (Jackson, 2001) were used to identify and define the scope of what falls into life-cycle costs and to consider the impact of early design decisions on future FM operational costs and achieving value for money through sustainable procurement.

Sustainability: The Triple Bottom Line sustainability concept (Savitz & Weber, 2006) was incorporated into the conceptual models to reflect the need to achieve the best value performance balance between the needs of users, society and the environment whilst producing a cost efficient building from a design and operation perspective.

Transition process and knowledge capture: Best practice was reviewed in the area of transition and capture of knowledge from the construction to operation phases. There are many excellent examples of best practice in this area (Baaninger, 2008), (Stierli, 2012), (Austin, 2005) etc. There are established specific procedures such as the FM SIA 113 process used in the Switzerland (SIA, 2010) and the now established UK Soft landings and Pit Stopping processes developed by BSRIA (Way & Bordass, 2009) and (Bunn, 2011) as well as the VALiD process (Austin, 2005). These were used when reviewing transition and knowledge capture in the design and construction process.

Combining these concepts and ideas the author developed the conceptual models to represent the value of FM Know-how in the design and construction process and to consider ways it could be measured.

3 METHODOLOGY

The research used a mixed method approach. This combined a qualitative literature review, in-depth semi-structured interviews with subject matter experts involved in the whole-life process, discussions with practitioners and other academics and a qualitative on-line survey to address the hypothesis; Can FM know-how add value and help optimize the performance and quality of a building over the whole life process?

3.1 Conceptual models

Two conceptual models; 4P Life-Cycle model – The Added Value of FM (Figure 1) and 4P Life-Cycle Measurement of FM Added Value (Figure 2) were created to explore how FM know-how can help buildings achieve optimum value through a balance of economic, environmental and social factors. These were then used in the interviews to explore the perception of how FM know-how adds value during the whole life process.

The first model:

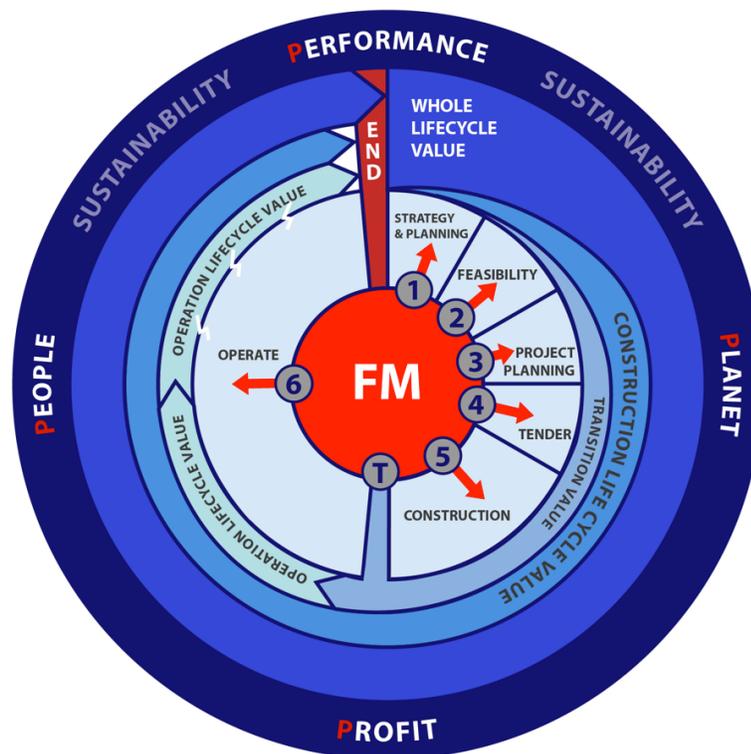


Figure 1: 4P Life-Cycle Model: The Added Value of FM

This model shows FM at the centre of the model with the red arrows outwards representing the application of FM know-how in each whole life phase of a buildings life cycle over time. The whole life phases (represented by light blue segments and grey numbered circles) are as per the established Swiss design and construction process SIA112 process but are generic in nature. It is difficult to accurately represent the relative timescales of each phase. As such the broken lines and larger segment for the operation phase reflect the fact that this is a significantly longer period (usually 30 plus years).

The outer blue dark ring representing the 4P idea of achieving a building design with an ideal and sustainable Performance, achieved by balancing value and benefits that meets the user’s needs (People), are as environmentally friendly as possible (Planet) and which result in a design that is has efficient construction and operation costs (Profit/savings) for the organisation.

Best value is achieved by using a transition process that links and combines the value elements of construction and the operational value. This is achieved by using FM know-how about users needs and functional requirements and combining these with established LCC methods. The ideal transition process should ideally start of the beginning of the project and allows a continuous improvement feedback mechanism with loops during each of the whole-life phases and which runs into the operational phase and has an aftercare programme built into the transition process to ensure the building functions as it was intended to in the design process and to make any changes once the users are actively using the facilities after the handover from construction to operation.

The second model:

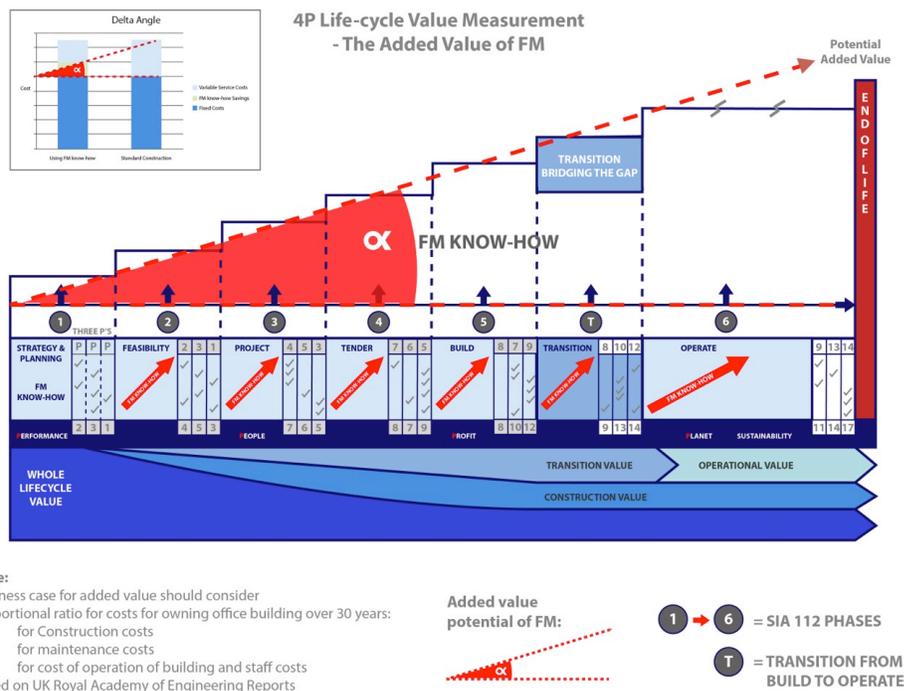


Figure 2: 4P Life-Cycle Measurement of FM Added Value

This model incorporates the ideas of the first model in a linear format, incorporating the idea of measuring the added value of FM know-how as a series of incremental steps in the whole life process. At each phase value is added to the process by asking a series of questions using FM know-how to regularly test that the best value and design is being achieved.

A series of questions based around the key sustainable areas of **People**, **Planet** and **Profit** (represented by the **Three P's** columns) are developed for each project (Note: these are not defined in this thesis). These are then used at the appropriate phase with the design and

construction team to test key FM issues and principles of usability, functionality, sustainability, energy efficiency etc. The review of these key issues and the answers represent FM added value to the project by having tested the design (represented as ticks in the Three P columns). The ticks are added up for each column to create a total nominal value for each phase. In each phase the accumulated knowledge is shown as a series of red “Know-how arrows” transferring the value from one phase to the next, cascading and resulting in an incremental increase in the accumulated know-how as the column totals increase.

The total potential added value of the FM know-how is represented in terms of the **Delta Angle (α) of FM know-how** between the two dotted red lines. A flat line would represent a building project where no added value is added using FM Know-how.

3.1 Interviews

Ten in-depth interviews were undertaken with representatives from the different stakeholder involved in the whole life process. To help avoid bias interviewees were selected through professional associations representing stakeholder groups key to the building whole-life process; property investors, FM and construction.

The interviews followed a semi-structured interview guideline. The conceptual models were explained and then interviewees asked a series of questions exploring their perception of the value of FM in each of the three main phases of; planning and construction, transition and operation. Each interview was 60-90 minutes in duration and was recorded for thematic coding at a later point.

3.1 On-line questionnaire

Feedback from the interviews was used to develop an on-line questionnaire as the collection instrument for the primary quantitative data. The format was as follows; initially the participants were asked what language they would like to use (German and English were offered). Then a general introduction was given describing the purpose of the questionnaire and an initial series of questions were asked which captured information about their background, experience, their stakeholder position in line with EN 15521 (CEN, 2011) etc. The next section of the questionnaire used a seven-point scale (1 = “strongly disagree”; 7 = “strongly agree”) to explore the perception of stakeholders as to the added value of FM know-how in each of the whole-life phases of planning, construction and operation of a building in alignment with SIA112 as follows:

- Phase 1 - Strategy and planning
- Phase 2 - Feasibility study
- Phase 3 - Project planning
- Phase 4 - Tendering
- Phase 5 - Construction
- Transition from Construction to Operation
- Phase 6 - Operation

The questionnaire was tested with five test cases to ensure the questions were appropriate, understandable. Distribution was via various stakeholder group organisations, on-line forums and from personal contacts in Switzerland, the UK and Denmark. A total of 62 fully completed questionnaires were captured.

4 ANALYSIS AND RESULTS

4.1 Qualitative main themes and subthemes

21 subthemes were identified during the interview process and grouped under the four key theme areas as per Table 1.

Table 1: Themes and sub-themes

Theme A) The Perception of FM Added Value and the Development of FM
A1) FM adds value
A2) Conceptual models
A3) Added value is difficult to measure, quantify and record
A4) FM in the local context
A5) Professional development of FM
Theme B) FM Added Value in Planning, Design and Construction
B1) Early involvement of FM in the design process
B2) Strategic recognition of FM
B3) FM Know-how and sustainability
B4) FM Know-how is key to ensuring users needs are met in the whole-life cycle of a building
B5) FM specialists should review design specifications, plans and workplace proposals
B6) Role of FM in project planning
Theme C) Improving the Transition Process by Using FM Know-how
C1) Recognition of transition phase
C2) Key issues and factors for customer in transition
C3) Organisation and management of transition for handover planning
C4) Optimisation of the transition process
C5) Knowledge capture/transfer in the transition process
Theme D) Use of FM Know-how in Operation
D1) Common understanding and recognition of EN 15221 FM standards, norms and sustainability certification systems
D2) The key FM value drivers
D3) Use of EN 15221 FM process or other process standards
D4) Relationships, teamwork and good communication
D5) Use of SLA, KPIs and performance monitoring

4.1 Quantitative analysis and results

The following background statistics were gathered on participants:

Survey Participation; In sum 123 people looked at the on-line questionnaire. 62 people completed the questionnaire with 60 people opting not to fully complete the questionnaire. 33 people answered in German and 29 in English. There were 13 female and 49 male participants.

Demographic Split: There was a wide demographic split with the majority (56.45%) based in Switzerland, 17.74% in the UK, 12.90% in Denmark, 3.23% in Germany and 9.68% from other countries including two from India, and one each from Australia, Austria, New Zealand and Spain.

Commercial Decision-Making Responsibility and FM Experience: 47 participants had direct influence whilst 15 had none. Table 4 shows there was also a broad range of stakeholder's experience in the FM sector; 56.5% had more than 10 years experience, 11.3% had between 6-9 years experience, 22.6% had between 3-5 years experience and 9.7% had less than two years experience.

EN 15221 roles: The participant's perception of their own role in line with EN15221 showed a split of: 37 FM Suppliers, 15 Clients (Building Owners/Investors), four End User of FM Services and four Customers.

Stakeholder groups; The split of stakeholders was; investors (10), facility managers (20), FM contractors/providers (10), Consultants (14) and design and construction (5).

Organisation size: Figure 37 shows the organisation size in terms of the number of employees. The majority (45.2%) had more than 500 employees, 9.7% had 201-500 employees, 11.3% had 51-200 employees, 21% had 11-50 employees and 12.9% has less than 10 employees.

From the questionnaire:

The **highest five** ranked factors (in terms of mean scores) were:

Score	Higher scoring factors
6.06	Users needs are fully captured in the design and planning process (Supporting the core corporate strategy, vision and mission)
6.00	The risk of poor quality or higher building maintenance costs are minimized
5.98	The optimum FM organization is in place to support the core business
5.97	User satisfaction with FM and a buildings facilities is achieved and contributes to the organizations productivity and employee welfare (well being)
5.94	Space usage planning is optimized to best meet the clients needs

The **lowest five** ranked factors (in terms of mean scores) were:

Score	Lower scoring factors
5.52	Project changes are reviewed before implementation to ensure they meet users needs and do unduly not increase operational costs

- 5.52 The proposed FM service design can be easily adjusted to meet changing customer requirements as efficiently as possible
- 5.52 Information is saved in the correct format for use in Clients CAFM or other Building Management Systems (BMS)
- 5.48 Ensuring buildings are designed in line with the Triple Bottom Line concept to best support their staff and environment whilst taking into account cost
- 5.34 Project teams can implement a sustainability certification system to ensure buildings are more sustainable

5 CONCLUSION

5.1 Key factors in how FM can optimise value creation in the whole-life process

The following five key conclusions were drawn when comparing the quotes from the interviews in the themes and subthemes with the quantitative questionnaire data and existing theory and best practice:

Early involvement of FM increases the potential to deliver value: The different stakeholders felt FM could add benefit and value in the whole-life process of a building. The research shows that the optimisation of value, knowledge capture and transfer is achieved by involving FM in the early strategic and planning phases ensuring users needs are met and the benefits of cost management, sustainability can be maximized.

Best value is delivered through a balance of economic, social and environmental factors: The best value is also clearly shown as being achieved by considering a balance of users needs with those of the environment and society whilst remembering that economic value drivers are key to acceptance by management.

FM know-how value is maximized over the long-term: Early involvement of FM know-how is necessary to ensure the design process meets users needs and that that initial FM concepts are fit for purpose. The optimal benefit of FM know-how is realized over the long-term with the introduction of strategies for; energy management, management of maintenance, operation and assets. For this reason FM know-how is best utilized not on projects where the investor is only interested in short term gains but where they have a long-term view and are looking at benefits over the long-term.

Transition Delivers Maximum Value when Viewed as a Process: In order to achieve the optimum value and transfer of knowledge from the planning and construction phases to operation Transition needs to be considered as a process starting early in the whole life process and not a single point in time after completion of the construction. This ensures optimal transfer of information and knowledge to the FM team allowing them to optimise the long-term building performance.

The Delta Angle (α) of FM Know-how Helps Visualize the Value of FM: The added value of FM can be clearly seen in the conceptual models. The concept of the delta angle (α) of FM Know-how shows how FM Know-how can help to deliver potential cost savings and ensure the optimum capture and transfer of knowledge.

The hypothesis has been tested by the author and found to be valid. FM Know-how can add value and help optimize the performance and quality of a building over the whole life process.

5.2 Theoretical implications

This study provides the idea of the delta angle of FM know-how and how it can be used to visualize how added value can be delivered to the building whole life process. There is a need now in future research to focus on ways that delta angle (α) of FM know-how can be measured and quantified in terms of the value FM can deliver in benefits to users, the environment and cost savings. The author believes that when this can be done all parties involved will take FM know-how very seriously.

5.3 Managerial implications

The research has implications for the three main stakeholder groups of property investors, FM and Construction. FM know-how can be used to increase the value of assets over the long term by reducing maintenance costs and increasing profits from rents of assets whilst at the same time improving the facilities and usability of assets. The research provides an incentive to all parties to ensure there is more involvement from facility managers who are ideally placed to understand the client's needs and thus act as the link to interpret the clients/users needs into design output requirements, meeting the objective of achieving buildings, which are seen as successful and meet their customers' needs. In turn this should lead to an improved reputation and repeat business.

5.4 Future research

Further research is needed to identify ways to quantify the measurement of the delta angle of FM know-how in the key areas of people, planet and profit. It is worth investigating in more depth the key FM knowledge that can be used in each phase to deliver practical tangible and intangible benefits and to consider the practical application in business to ensure the early involvement of FM in the design and improve the overall transition process by looking at critical FM factors in each phase of the whole-life process.

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