

# KEY KNOWLEDGE VARIABLES FOR FACILITIES MANAGEMENT ORGANISATIONAL EFFECTIVENESS

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Although knowledge management concept has grown noticeably during last few years, management of facilities knowledge has been little studies. Facilities knowledge is of crucial importance for organisational effectiveness and makes a proactive contribution to business to achieve competitive advantage. The research addresses the importance of managing facilities knowledge and to reveal the key knowledge variables by examining the current practice and gaps in application of knowledge management techniques in facilities management context. The intellectual capital framework is introduced as a conceptual model with which facilities users can identify and organise facilities knowledge in a purposeful way.

Keywords: business strategy, facilities management, knowledge management.

## INTRODUCTION

The practical relevance of Facilities Management (FM) to organisations in all sectors of the economy is increasingly recognised. Hence, the strategic role of FM is emphasised and the opportunities provided through effective management are better understood. The attraction of FM is becoming increasingly common, as forward-looking organisations are beginning to realise FM as a function with clearly defined objectives, and as a strategic and commercially oriented discipline (Alexander 1996). Further, as the case for a strong link between FM and organisational performance was made by Duffy as far back as in 1988, managements have begun to realise that for organisations to benefit from their enormous investment in facilities, they have to begin managing them actively and creatively with commitment and a broader vision.

As a source of economic success, knowledge is increasingly seen as having displaced traditional factors of production (Drucker 1992). Managing such knowledge is arguably the strategic concern for many firms. Yet, Knowledge Management (KM) has been little studied in the context of FM despite a theoretical proposition that it is one future (Nutt 2000), or perhaps the future (Price 2000) of the discipline. Indeed the management of facilities knowledge may be the most underutilised tool in KM (Nutt & McLennan 2000) and such a knowledge perspective may supply the conceptual framework with which facilities users can understand and measure the business benefits they derive from such services. FM knowledge continues to be borrowed from other fields, and knowledge tends to be holistic, yet faces up to the “real” issues of design for the future management of facilities in use (Nutt 1999). While the relevancy and potential value of available technical and management expertise is recognised, its application to the specifics of facilities operations and management is

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still poorly developed. As such, research has emphasised that there is a clear need to critically manage FM knowledge which would integrate both the business and facilities domains.

Accordingly, this paper is aimed at identifying key KM dependence variables for FM organisational effectiveness. In this context, the paper is divided into three broad areas, where initially an overview of FM and its prevalent trends are discussed. Secondly KM is examined to highlight its different perspectives and later the current status of KM within FM is considered which outlines the problems and gaps in the application. Finally the intellectual capital framework is introduced to identify and organise facilities knowledge in a logical way.

## **AN OVERVIEW OF FM**

Facilities Management, as one of the fastest growing professional disciplines, continues to expand and develop in terms of volume and diversity of commercial activity (Barrett and Baldry 2003) and appears to be gaining greater recognition and acceptance as a significant influence upon organisational success and goal achievement. Hence, it is widely accepted that FM covers a wide range of facility services and the management of which can contribute to the relative success or the partial failure of an organisation's business (Chotipanich 2004). Further, FM is increasingly being considered as a strategic and commercially orientated discipline with the severe commercial and competitive pressures exerted on business in both private and public sector, to seek some form of competitive advantage from every part of their organisation. Yet, literature reveals many definitions of FM may be due to diversity of the discipline. In broader sense, FM is concerned with the dynamic interaction between an organisation's personnel, process and place (Laird 1994). Yet, within the diversified definitions of FM, as Tay and Ooi (2001) argued few common recurring themes could be identified. Most commonly FM is defined as a practice consist of place or facility, people or user of the building, and process or activities within the facility, as highlighted by several definitions in the past.

As Douglas (1996) asserts FM is considered to be the co-ordinating management function that concentrates on the interface between the physical workplace (in the context of commercial property) or physical "use-place" (in relation to non-commercial property) and people. In a similar vain, the British Institute of Facilities Management (1999) defines FM as "the practice of coordinating the physical workplace with the people and work of an organisation". Both these simple definitions stress work place orientated practice of FM. Yet, according to Chotipanich (2004), the primary function of FM is to handle and manage support services to meet the needs of the organisation, its core operations and employee. Hence, FM is the support function coordinating physical resources and workplace, and support services to user and process of works to support the core business of the organisation, which highlights the support function of FM practice. But both these, work place focused and support service orientated definitions fails to stress the contribution that well managed facilities can make to an organisation. As the practice of FM gradually matured some apparent shifts in the focus was evident. According to Shiem and Then (1999), a shift has been towards resource integration in FM. Highlighting this apparent shift, Atkin and Brooks (2000) define FM as "an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organisation in order to create an environment that strongly supports the primary objectives of that organisation". According to this, the aim of FM should be not just

to optimise running costs of buildings, but to raise the effectiveness of the management of space and related assets for people and processes in order that the mission and goals of the organisation may be achieved at the best combination of efficiency and cost (Spedding and Holmes 1994). The recent shift in the focus of FM suggests that FM is essentially demand driven and should be closely related to strategic planning in an organisation.

As Alexander (1996) defines, FM is the process by which an organisation ensures that its buildings, systems and services support core operations and processes as well as contributing to achieve its strategic objectives in changing conditions. Further this outlines two major aspects of FM i.e operational and strategic level. FM involves the management of organisation's facility resources and support services in two levels: operational and strategic (Barrett 1995; Nutt 2002). Nutt (2004) defines FM as the management of infrastructure resources and services to support and sustain the operational strategy of an organisation over time, which highlights the importance of operational strategy within FM. However, as the nature and characteristic of organisations are likely to vary too, different organisations are differently reliant on their facilities and support services, and affected by environment and context. Some organisations may focus very much on business strategic issues, while other organisations may only emphasise on their operational process and short-term outputs. The way FM is managed during past and present is underlined in recurrent trends in FM domain. Hence, the succeeding section outlines the important contribution of FM to organisational effectiveness and its underline trends apparent in the past.

## **UNDERLINE TRENDS IN FM**

One of most common claims made by facilities managers is that FM is of crucial importance to business and that it makes a significant contribution to business success. As Alexander (1996) asserts, the role of FM in its contribution to the success of the organisation has had increasing importance since the origins of the concept of FM. Initially FM was managed as an isolated activity and considered as an overhead like any other cost in the budgeting process. Yet, presently FM is managed as an integrated activity, integrated with the commercial, manufacturing and marketing function of the enterprise. As such, this closer integration of facilities brings important advantages to provide a competitive advantage (Alexander 1996; Puddy *et al* 2001). As highlighted in the previous section, the growing focus in FM definitions is to view it as management of non-core company assets and activities to support and increase the efficiency of the core business of the organisation. As such, it seeks organisational effectiveness to help organisations to allocate its resources in a way that allows them to flourish in competitive markets. Hence, this has resulted management to realise that for organisations to benefit from their enormous investment in facilities, they have to begin managing them actively and creatively, with commitment and a broader vision (Amaratunga 2001). As such, management had to link facility planning and management to the kinds of social and organisational trends identified by various writers (Barrett 1995; Then 1999). Thereby, these trends and changes to the management of facilities over last few decades are highlighted in four generations of FM as highlighted by Amaratunga (2001).

Within the first generation of FM, it was merely considered as an overhead to the organisation (Becker 1990) and therefore as something to be managed for minimum cost rather than optimum value (Price and Akhlaghi 1999). Hence, FM was characterised working in isolation to the rest of the organisation and was criticised for

the lack applicability of the output of the FM function for the organisational effectiveness. The integration of FM process perspective was characterised with the second generation of FM. Thereby within this generation, FM promoted the process focus between the organisation's individual and businesses and the FM organisation by making FM activities within the organisation, a continuous process (Amaratunga 2001). In the next generation, FM is seen as more concerned with resource management, concentrating on managing supply chain issues associated with the FM functions. This changing focus in FM as an integrated resource management, stressed the importance of understanding FM as a business context. Yet as contended by Then (1999), in order to achieve the much needed alignment between organisational structure, work processes and the enabling physical environment, the organisation's strategic intent must clearly reflect the facilities dimensions in its strategic business plans, which represented the fourth generation of FM. This further highlight the recent focus in FM definitions as discussed in the previous section.

According to Tuveson (1998) and Barrett (2000), there needs to be a match between FM and organisational and business strategies and their delivery process, representing the main issues behind the fourth generation of FM. Then (1999), outlined three emerging themes within strategic FM i.e. linking facilities decisions to corporate strategy, proactively managing facilities as a business resource, and measuring facilities performance to understand fully, the strengths of the above relationships. Yet by taking a different stance, Nutt (2000) highlights four basic 'trails' to the future by considering the risks and opportunities within the strategic directions of FM.

- Financial Resource Trail - Business
- Human Resource Trail - People
- Physical Resource Trail - Property
- Information Resource Trail - Knowledge

Having identified four basic trails for the future, further he stresses the significance of the management structure that links knowledge and experience across these financial, human and physical areas of concern. Hence, this highlights the growing importance of managing facilities knowledge (knowledge trail) as a strategic resource in future. As such, the following section examines the concept of KM and what constitutes knowledge in general.

## **KNOWLEDGE MANAGEMENT IN GENERAL**

The view that knowledge is a valuable organisational resource has become widely recognised and accepted in the business community. One consequence is the increase in organisations' efforts to deliberately manage knowledge in a systematic manner. Yet, an understanding of what constitute 'knowledge' is central to its effective management. Definitions of knowledge range from the practical to the conceptual to the philosophical and from narrow to broad in scope. Knowledge is built from data, which is first processed into information. There seems to be a large misconception in considering knowledge interchangeably with information. However, the various definitions of knowledge suggest that it is much more than information. As Grey (1996) contends knowledge is the full utilisation of information and data, coupled with the potential of people skills, competencies, ideas, intuition, commitment and motivation. This definition stresses the involvement of human beings and as Beveren (2002: 19); asserts "*Even though some argue knowledge can be acquired, stored and*

*used outside of the human brain, knowledge cannot exist outside of the human brain and that only information and data can exist outside of the brain*". This further has fuelled the attempts to distinguish between knowledge and intellectual capital and too often the delineation between the two terms is unclear and seldom adequately addressed (Guthrie 2000). However, it is necessary to view knowledge on the basis of its final use and/or on the basis of the context of its use (Carrillo *et al* 2000). This underscores the fact that knowledge can be viewed as a component of a task performing system. That is, a state of that system which warrants task completion, and the future repetition of this task (ibid: 2). Thereby, information becomes knowledge when it enters the system and when it is validated (collectively or individually) as a valid, relevant and useful piece of knowledge to implement in the system (Blumentritt and Johnston 1999).

Despite various definitions and classifications of knowledge, work by Polanyi (1958), Nonaka and Takeuchi (1995), divided knowledge into tacit and explicit. Although knowledge could be classified into personal, shared and public; practical and theoretical; hard and soft; internal and external; foreground and background, the classification of tacit and explicit knowledge remains the most common and practical. Tacit knowledge represents knowledge based on the experience of individuals, expressed in human actions in the form of evaluation, attitudes, points of view, commitments and motivation (Nonaka *et al* 2000). Since tacit knowledge is linked to the individual, it is very difficult, or even impossible, to articulate. Explicit knowledge, in contrast, is codifiable knowledge inherent in non-human storehouses including organisational manuals, documents and databases. Yet, it is difficult to find two entirely separated dichotomies of tacit and explicit knowledge, instead knowledge can fall within the spectrum of tacit knowledge to explicit knowledge. Whatever the classification it takes, knowledge has become more relevant to sustaining business performance than capital, labour or land (Drucker 1992) and considered as a very crucial factor affecting an organisation's ability to remain competitive (Amit & Schoemaker 1993; Grant 1996; Kogut & Zander 1992; Krogh & Roos 1996; Peteraf 1993; Spender 1996) in today's fast changing and non-linear business environment. Hence, KM as a concept has emerged explosively and has become a hot topic in the business community over last few years. Academics and practitioners from different disciplines have become active partners in this relatively recent phenomenon.

Review of current literature reveals numerous definitions and techniques of KM due to wide range of interest, perspectives and issues represented by different authors. These fall mainly into the IT perspective (Explicit knowledge) where authors focus on IT tools to deliver KM solutions (Ruggles 1997; Bair and O'Connor 1998), the Human Resource (Tacit knowledge) perspective that relies on the people aspect to provide KM solutions (King 1999; Egbu *et al* 2001) and the integrated perspective which acknowledges that both the IT and HR perspectives complement each other (Scarbrough *et al* 1999; Tiwana 2000). The early focus on KM resulted in technological solutions with a bias towards the use of IT, however, many of these were not successful because they ignored the people required to make them work in construction (Carrillo 2004). Too often, KM is limited to the appropriation and exploitation of explicit knowledge, with a very high emphasis on the role of IT. Tacit knowledge or human aspect is either ignored or 'converted' to explicit knowledge.

Yet with the realisation of the strategic importance of people factor, within the last decade, there has been an increasing interest in the tacit dimension of knowledge, which is perhaps hardest to manage, as it cannot be formally communicated and is

often embedded within human beings. As Herrgard (2000) suggests, tacit knowledge is obtained by internal individual processes like experience, reflection, internalisation or individual talents. Individuals are the primary repositories of tacit knowledge that due to its transparent characteristics is difficult to communicate and therefore cannot be managed and taught in the same manner as explicit knowledge. While highlighting the importance of tacit knowledge, Tiwana (2000) defines it as know-how that is stored in people's heads which is personal, acquired mainly through education, training and experience. In a similar sense, Saint-Onge (1996) describes tacit knowledge as an individual's intuition, beliefs, assumptions and values, formed as a result of experience. It is from these beliefs and assumptions, which make up an individual mindset that decisions are made and patterns of behaviour developed. Thereby, within FM context, one can easily find many examples of tacit knowledge such as intuition, rule-of-thumb and personal skills, all based on individual experiences of facilities managers. Hence, the strategic importance of human knowledge can't be underestimated in facilities organisations. Thus, succeeding section outlines the current problems of KM applications in FM context.

## **KM APPLICATION IN FM CONTEXT**

KM is of strategic concern for many organisations in today's business environment; hence, there has been a growing interest in KM within FM recently. The London Times (Hoare 1999) calls KM as the "fifth discipline" after business strategy, accounting, marketing, and human resources and called upon British companies to harness it to improve their performance and profitability. Yet, KM has been little studied in the context of FM despite a theoretical proposition that it is one future (Nutt 2000) of the discipline. Indeed the management of facilities knowledge may be the most underutilised tool in KM (Nutt & McLennan 2000) and such a knowledge perspective may supply the conceptual framework with which facilities users can understand and measure the business benefits they derive from such services. According to Nutt (1999), FM knowledge is of crucial importance and makes a proactive contribution to business, where FM still tends to be technically orientated and reactive.

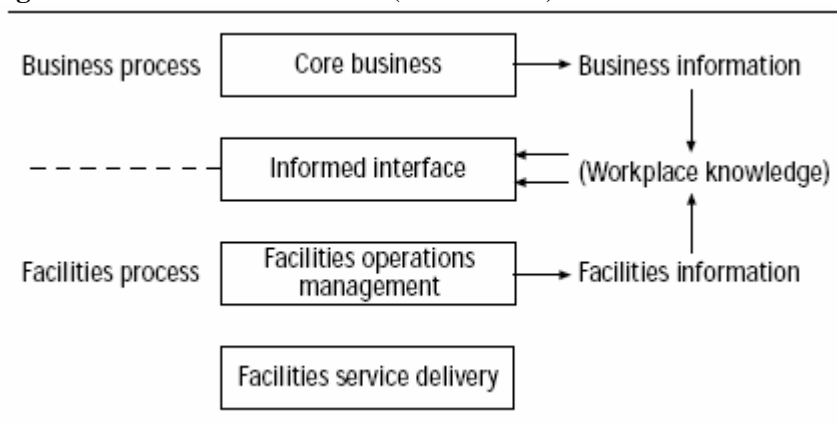
Within this context, FM knowledge continues to be borrowed from other fields, and knowledge tends to be holistic, yet faces up to the "real" issues of design for the future management of facilities in use (Nutt 1999). While the relevancy and potential value of available technical and management expertise is recognised, its application to the specifics of facilities operations and management is poorly developed. As contended by Nutt & McLennan (2000), the FM knowledge trail is at an early stage of development in which:

- It sets out from an ever widening and ill-defined sphere of activity
- It still needs greater internal coherence for many working in the field
- It lacks external coherence to many corporate and business organisations, and to the educated public at large
- It has too few secure methods of its own to underpin good practice
- It has already begun to make its own distinctive contribution within the management field
- It is insufficiently supported by adequate knowledge base

Further highlighting two facets of KM techniques i.e. IT perspective and human resource perspective, discussed in the previous section, Nutt & McLennan (2000) stress the two KM knowledge perspectives that needs to be considered within FM, those of the corporate organisation and those of the individual employee. New strategic knowledge for FM could become a principal component of corporate knowledge value, as information begins to define market share for products and services around the world, with ICT providing the means for real time management, globally. Although much concern is devoted in corporate knowledge perspective, yet individual knowledge perspective is in the embryonic stage in FM. This has been highlighted by Nutt & McLennan (2000) who contend that “initiatives for innovation in the individual’s FM knowledge systems are hard to find.” Understanding the types of knowledge facility managers may need, use and create in the future is an important area for investigation. As suggested by Amaratunga (2001), facilities managers needs to value their entrepreneurial skills and knowledge of the core organisation, with the ability to pre-empt and translate the organisation’s need for change into facilities strategies which underpin operational objectives to yield competitive advantage. Further, if the changes to work and employment practices continue with more flexible employment contracts then the need for self contained, personal, versatile and portable FM knowledge systems will intensify (Nutt 2000). This stresses the importance and the necessity to recognise the concept of knowledge worker within FM organisations, which has gain increased concerns in other disciplines.

Recent experience in the management of non-core business processes consistently highlights a strong demand from customers for a more proactive approach to facilities strategy. Facilities managers are more often expected to advise an organisation’s core management on the type, and level, of service provision which best fit their needs. In addition, they must constantly reappraise services in the light of changes to the core organisation. These roles, of analyst, adviser, and constant educator to the customer, are tasks for which the majority of facilities managers are not supported (Carder 1995). This emphasises the underline importance of an organisational specific KM system and stresses the demand side requirements of performance knowledge which bridges between the core organisation and the workplace infrastructure, to support emerging FM roles.

**Figure 1:** The informed Interface (Carder 1995)

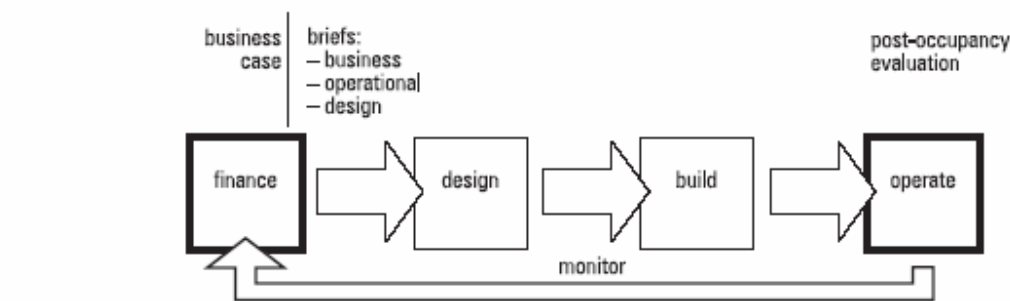


By addressing this issue Carder (1995), introduces “informed interface” (refer Figure 1) as a key role in the new knowledge-based FM organisation. According to him by taking the tasks of analyst, adviser and educator of the customer, this interface role is

increasingly needed between the customer and operational management and delivery services. The interface role will be required to understand and use both business and facilities information, combined to create organisation- specific workplace knowledge.

Moreover, as contended by McLennan (2000), in the commercial office sector, both the in-house and outsourced facility manager is poorly placed to exploit their knowledge base. As suggested by him, the basic reasons for this can be seen in Figure 2, which sets out a generic process that describes the flow of information and the feedback loop that is critical in understanding where the knowledge value lies for facility managers. The arrow moving from the “operate” to “finance” boxes represents the information feedback loop, essentially the formalised monitoring of business objectives. This feedback loop allows measurement of the business objectives and criteria against the physical resource performance. The facility management professional provides the information that closes this loop.

**Figure 2:** Information flows for physical resources (McLennan, 2000)



The feedback loop in Figure 2 does not exist (McLennan 2000; Puddy *et al* 2001) and it remains elusive and any knowledge gained is quickly dispersed, failing to provide an opportunity for facility management to exploit fully the knowledge gained through operating buildings. Adding to this as Puddy *et al* (2001) argued, FM is only beginning to understand the need for effective collaboration to extract the best from available operational knowledge. As he assets the process of policy creation is not fully capturing the existing operational knowledge, failing to meet the expectations of the users. All these different facets highlight the existing gaps in the recognition and management of facilities knowledge and demand for a careful identification and organisation of facilities knowledge variables for organisational effectiveness.

## DISCUSSION

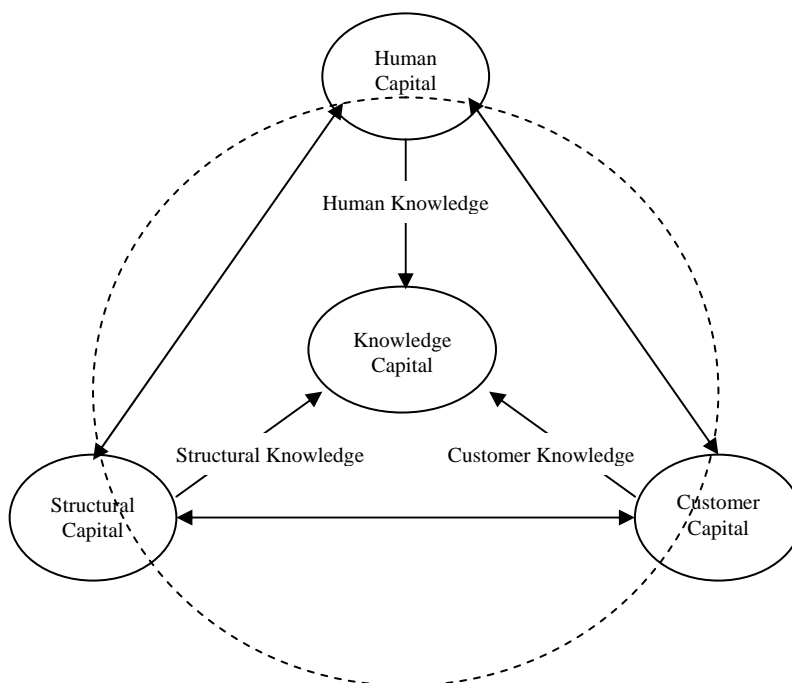
As discussed before, people and knowledge trails have become the future opportunity within the strategic direction of FM. Further, the importance of human centred KM techniques is highlighted through review of general KM literature. The current status of KM within FM context and perceived gaps within current applications were discussed in the previous section, in which both corporate organisational and individual employee knowledge perspectives are highlighted. Hence, it is synthesise that the application of KM within FM context needs to be focused on the people or human aspects and the suitability of intellectual capital framework (refer figure 3) is considered within this section.

As McLennan (2000) argues, the specific FM knowledge that has strategic value is the understanding of the relationship between the performance of the physical resources



and their impact on the customer being served by these resources. Hence, this type of knowledge can be difficult to access since it is often tacit and experimental in nature. However, the intellectual capital framework provides an opportunity to deal with this area of knowledge. Intellectual capital is defined as: “packaged useful knowledge” (Stewart 1997). Further when synthesising the literature, intellectual capital is commonly referred to combination of human capital, structural capital and customer capital. It is asserted (Edvinsson, 2000) that the human capital in an organisation is the most important intangible asset. The unique tacit knowledge of individuals is of immense value to the organisation as a whole, and is the “wellspring of innovation” (Stewart 1997). Within the context of FM, Human capital includes the knowledge and capabilities of the individuals to provide solutions to customers and also the basis for innovation. For the FM, it is the realisation that they hold a unique information data set on the physical resource and its use through time by particular organisations that provides the opportunity. Structural capital describes the internal structure of an organisation, which is always context specific. Hence, it comprises the strategy, operating systems, physical resources and work processes of FM business. Customer capital encompasses the external intangible assets of an organisation. External forces play a part in determining the market position and strength of an organisation. Customers are the principal determinants of this position (Smith and Saint-Onge 1996), which is essentially valid within the FM context. FM knowledge base is created with the interaction of these three different areas i.e. Human capital, Structural capital and Customer capital (refer figure 3) to create value for the business.

**Figure 3:** Intellectual capital framework



Several existing gaps in terms of recognising and managing facilities knowledge were identified in the previous section. The knowledge worker concept; evolving role and demanding skills of facilities manager; specific workplace related performance

knowledge; recognition of feedback process; knowledge on customer requirements; all could be identified and incorporated within the intellectual capital framework. As such, this framework provides a valid basis to identify and to organise FM knowledge in a purposeful way.

## CONCLUSION

The paper addressed the importance of managing facilities knowledge and to reveal the key knowledge variables by examining the current problems and gaps in application of knowledge management techniques in facilities management context. The intellectual capital framework was introduced as a conceptual model with which facilities users can identify and organise facilities knowledge in a rational way. This provides a valid basis to empirically test the suitability of the intellectual capital framework in identifying and organising the facilities knowledge variables for organisational effectiveness.

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## REFERENCES

- Alexander, K (1996) *Facilities Management theory and practice*. Norwich: E & FN Spon.
- Amaratunga R D G (2001) *Theory Building in Facilities Management Performance Measurement: Application of some Core Performance Measurement and Management Principles*. Unpublished PhD Thesis, The University of Salford.
- Amit, R and Schoemaker, P J H (1993) Strategic assets and organizational rent. *Strategic Management Journal*, **14** (1), 33-46.
- Atkin, B and Brooks, A (2000) *Total Facilities Management*, Oxford: Blackwell Science.
- Bair, J H and O'Connor, E (1998) The state of the product in knowledge management. *Journal of Knowledge Management*, **2** (2), 20-7.
- Barrett, P (2000) Achieving strategic facilities management through strong relationships. *Facilities*, **18** (10-12), 421-6.
- Barrett, P (1995) *Facilities Management: Towards Better Practice*. Oxford: Blackwell Science
- Barrett, P and Baldry, D (2003) *Facilities management: towards best practice*. 2<sup>nd</sup>, Oxford: Blackwell Science.
- Beckman, T (1997) *A methodology for knowledge management*, International association of science and technology for development AI and soft computing conference. Canada.
- Beveren, J V (2002) A model of knowledge that refocuses knowledge management. *The Journal of Knowledge Management*, **6** (1), 18-22.
- Blumentritt, R and Johnston, R (1999) Towards a Strategy for Knowledge Management. *Technology Analysis and Strategic Management*, **11** (3), 287-300.
- Carder, P (1995) Knowledge-based FM: managing performance at the workplace interface. *Facilities*, **13** (12), 7-11.
- Carrillo, P. (2004) Managing knowledge: lessons from the oil and gas sector. *Construction Management and Economics*, **22**, 631-642.

- Carrillo, P M Anumba, C J and Kamara, J M (2000) *Knowledge management for construction: key IT and contextual issues*. In: Gudnason, G (ed.) Proceedings of the Inter. Conf. on Construction IT, 28-30 June, Reykjavik, Iceland, Icelandic Building Research Institute, 155-165.
- Chotipanich, S (2004) Positioning facility management. *Facilities*, **22** (13/14), 364-372.
- Douglas, J (1996) Building performance and its relevance to facilities management. *Facilities*, **14** (3/4), 23-32.
- Drucker, P (1992) *Managing for the Future: The 1990s and beyond*. New York: Truman Talley Books, NY
- Edvinsson, L (2000) Some perspectives on intangibles and intellectual capital 2000. *Journal of Intellectual Capital*, **1** (1), 12-16.
- Egbu, C O Botterill, K and Bates, M (2001) *A conceptual framework for studying knowledge management in project-based environments*, In: Proceedings of the First International Conference on Postgraduate Research in the Built Environment, University of Salford, UK, 15-16 March, 186-95
- Grant, R M (1996) Toward a knowledge-based theory of the firm. *Strategic Management Journal*, **17** (Winter special issue), 109-122.
- Grey, D (1996) *What is knowledge [online]*. The knowledge management forum, Available From : [http://www.km-forum.org/what\\_is.htm](http://www.km-forum.org/what_is.htm)
- Guthrie, J (2000) Intellectual capital review: measurement, reporting and management. *The Journal of Intellectual Capital*, **1** (1).
- Herrgard, T H (2000) Difficulties in the diffusion of tacit knowledge in organizations. *Journal of Intellectual Capital*, **1** (4), 357-365.
- Hoare, S (1999) *It's True: Knowledge is Power*. The Times, London. May 24.
- King, W R (1999) Integrating knowledge management into IS strategy. *Information Systems Management*, fall, 70-2.
- Kogut, B and Zander, U (1992) Knowledge of the firm, combinative capabilities and the replication of technology. *Organization Science*, **3** (3), 383-397.
- Krogh, G and Roos, J (1996) *Managing knowledge, Perspectives on cooperation and competition*. London: Sage publication.
- Laird, S (1994) Total Facilities Management. *Facilities*, **12** (13), 25-26.
- McLennan, P (2000) Intellectual capital: future competitive advantage for facility management. *Facilities*, **18** (3/4), 168-171.
- Nonaka, I and Takeuchi, H (1995) *The knowledge creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University press.
- Nonaka, I Konno, N and Toyama, R (2000) Emergence of Ba. In Nonaka, I and Nishiguchi, T (Eds), *Knowledge emergence: Social, technical and evolutionary dimensions of knowledge creation*. Oxford: Oxford University press.
- Nutt, B (2004) *Infrastructure and facilities: forging alignments between supply and demand*. Conference Proceeding of Future in Property and Facility Management II, a two-day international conference, London: University College London.
- Nutt, B (2002) The essence and value of facility management. in Chotipanich, S. (Ed.), *Facility Management Thailand, 2002*, Bangkok: Chulalongkorn University.
- Nutt, B (2000) Four Competing Futures for Facility management. *Facilities*, **18** (3/4), 124-132.

- Nutt, B and McLennan, P (2000) *Facility Management: Risks and Opportunities*. Oxford: Blackwell Science.
- Nutt, B (1999) *Strategic Management: Strategic Decision Four Competing Directions for the Future*. In the Proceedings of Conference on Futures in Property and Facility Management. London. 27-35.
- Peteraf, M A (1993) The corner stones of competitive advantage: A resource based view. *Strategic Management Journal*, **14**, 179-191
- Polanyi, M (1958) *Personal Knowledge Towards a Post-critical Philosophy*. London: Routledge and Kegan Paul Ltd
- Puddy, F R Price, I & Smith, L (2001) FM Policies and Standards as a Knowledge Management System. *Facilities*, **19** (13/14). 504-514.
- Price, I (2000) *From Outputs to Outcomes: FM and the Language of Business*. In Then, D.S.S (Ed.) Proceedings of the WIB70 conference. Brisbane, Australia
- Ruggles, R (1997) *Knowledge Management Tools*. Butterworth-Heinemann, Boston, MA.
- Saint-Onge, H (1996) Tacit knowledge: the key to the strategic alignment of intellectual capital, *Strategy and Leadership Journal*, **24** (2), March/ April.
- Scarborough, H Swan, J and Preston, J (1999) *Issues in People Management: Knowledge Management: A Literature Review*. Institute of Personnel and Development, Wiltshire: The Cromwell Press.
- Smith, P A C and Saint-Onge, H (1996) The evolutionary organization: avoiding a titanic fate. *The Learning Organization*, **3** (4), 4-21.
- Spedding, A and Holmes, R (1994) Facilities management. In Spedding A (Ed). *CIOB book of facilities management*. London: Longman Scientific & Technical.
- Spender, J C (1996) Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal*, **17**, special winter issue, 45-62.
- Stewart, T (1997) *Intellectual Capital*. London: Nicholas Brealey Publishing Ltd.
- Tay, L and Ooi, J T L D (2001) Facilities management: a “Jack of all trades”?. *Facilities*, **19** (10), 357-362.
- Then, S and Danny, S (1999) An integrated resource management view of facilities management. *Facilities* **17** (12/13), 462-469.
- Tiwana, A (2000) *The Knowledge Management Toolkit*. New Jersey: Prentice Hall.
- Tuveson, K (1998) Facilities management in 21st Century. *Managing office technology*, **43** (4), 14-16.