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Outsourcing decision factors of building operation and maintenance services in hospital business

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Abstract

Building Operation and Maintenance (BOM) is the important activities which can help hospital to get the advantage over competitors. Outsourcing is an approach exists of the BOM to perform the service for customers instead of businesses. The objectives of this paper are to identify, prioritize, and categorize the decision factors of hospital managers for outsourcing the BOM services. From the literature review, the set of 56 factors believed to affect the decision which can group into 6 groups namely: strategic, management, technological, economical, quality, and function-characteristics. The 35 of biggest hospitals in Bangkok, Thailand were surveyed by using the questionnaires and analyzed with Relative Importance Index (RII) and Factor Analysis (FA). There are 35 respondents include: 31 BOM managers, 3 BOM deputy/assistant managers, and 1 BOM supervisor. All the respondents have considerable experience, e.g. 77% respondents have more than 10 years. The RII results indicate that the quality, management, technological, strategic, function-characteristics, and economical in first to sixth position of factors. After that, the 3 factor groups were classified from the top 10 factors with using FA method include: responsiveness, management, and quality. These findings can understand the respect of managers in hospital business.

Keywords: Outsource, Decision factor, Building operation and maintenance, Hospital

1. Introduction

Hospital building is a type of building in commercial sector which fulfil a key role in the provision of health. This business comprises several units to provide general healthcare which have complex engineering services [1]. The BOM are the important activities from using the building as a part of attractive and service customers. These activities have to spend a half of total cost in building life cycles from the cost analysis. The BOM works have the wide range for building components and specialist engineering services. From the surveyed in commercial sector, 9 out of every 10 enterprises have shared services and 97 percent manage outsourcing relationships [2] that mean outsourcing has become an important tool to complement shared services strategies and accelerate business benefits. This paper reviewed the published studies in order to identify a comprehensive list of factors affecting the outsourced BOM services. Following this, the findings of a survey targeting managers were to prioritize the top factors influencing outsourcing decision. Finally, this paper grouped the key factors to decide the outsourced BOM services.

2. Materials and methods

2.1 Questionnaire design

From literature reviews on the outsourcing of BOM before the 1970s, outsourcing was adopted only to reduce costs. After that, the studies about the outsourcing of BOM have been increased on various aspects. Based on the meaning and previous study, there are 56 factors in 6 groups (strategic, management, technological, economical, quality, and function characteristics) [1-6] that were established to the questionnaire. To get proper questionnaire design, the discussions firstly performed with 4 domain BOM experts. Then, a preliminary questionnaire was designed and piloted by the BOM staff. The final version of questionnaire consists of the general information of respondents and 56 outsourcing decision factors. 5 - point scaling survey with 5 being "extremely important" and 1 being "not important" was adopted to solicit the perceptions. Based on the questionnaire survey, the value of Cronbach's Alpha was 0.938 that indicated high internal consistency [7].

2.2 Data collection

The surveying was distributed in Bangkok, Thailand where has won the "World's Best City Award 2013" organized by Travel and Leisure magazine for the 4th consecutive year. Questionnaires were sent to the top selected hospital companies which were identified from the listings of the Private Hospital Association (Thailand) by using the criteria including the number of beds must be more

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Table 1 Summary of RII and rank for the outsourcing decision factors

		Outsourcing Decision Factors	RII	Rank	Group RII	Group Rank
Strategic	S1	accelerate re-engineering benefits	0.777	12	**0.729**	**4**
	S2	access to world class capabilities	0.771	14		
	S3	risk sharing with outsourcing	0.766	15		
	S4	lack of internal resources for a service	0.743	23		
	S5	focus on core activities	0.726	26		
	S6	freeing resources for core activities	0.726	26		
	S7	outsourcing will augment strategic planning	0.720	28		
	S8	regulations governing outsourcing practices	0.703	32		
	S9	improve flexibility to the changing market dynamics	0.686	41		
	S10	strategic alliance with contractors	0.669	45		
Management	M1	need for specialized management	0.817	2	**0.750**	**2**
	M2	increase the speed of implementation	0.811	3		
	M3	function difficult to manage	0.800	5		
	M4	improved management control	0.794	8		
	M5	safety management	0.783	11		
	M6	improved operational efficiencies/ productivity	0.760	16		
	M7	reduce the management load	0.720	28		
	M8	save the management time	0.703	32		
	M9	career path development	0.566	56		
Technological	T1	acquire new skills or technical knowledge	0.794	8	**0.733**	**3**
	T2	copy competitors	0.760	16		
	T3	need for specialized expertise	0.754	18		
	T4	initiate innovative ideas and technology	0.737	24		
	T5	achieve flexibility with changing technology	0.697	35		
	T6	improve the technology for competitive advantage	0.697	35		
	T7	technology requirements uncertainty	0.691	40		
Economical	E1	save the overall cost	0.709	31	**0.666**	**6**
	E2	reduce space/ right-sized headcount	0.703	32		
	E3	closest to internal cost estimate	0.697	35		
	E4	reduce the labor and operating cost	0.686	41		
	E5	increase the economic efficiency	0.686	41		
	E6	make the fixed costs into variable costs	0.663	47		
	E7	tax benefits/ tax gain	0.634	52		
	E8	improve the cash flow	0.617	53		
	E9	cash infusion	0.611	55		
	E10	make capital funds more available for core activities	0.651	50		
Quality	Q1	responsiveness	0.829	1	**0.762**	**1**
	Q2	procure higher competency	0.806	4		
	Q3	procure higher reliability	0.800	5		
	Q4	ensure the responsibility	0.800	5		
	Q5	improve service quality	0.789	10		
	Q6	improve quality requirements	0.777	12		
	Q7	achieve high quality service for competitive advantage	0.754	18		
	Q8	commitment to quality	0.714	30		
	Q9	past relation/ performance/ transaction	0.686	41		
	Q10	representatives to solve problem or answer question	0.669	45		
Function-characteristics	F1	complexity of function	0.754	18	**0.697**	**5**
	F2	lack in equipments/ tools availability	0.754	18		
	F3	function difficult to control	0.749	22		
	F4	no planning/ no operating procedures	0.731	25		
	F5	lack of spare parts	0.697	35		
	F6	resource capability	0.697	35		
	F7	no as-built drawings/ maintenance manuals	0.663	47		
	F8	post-contract service	0.657	49		
	F9	function integration and structure	0.651	50		
	F10	popularity or cultural	0.617	53		

Table 2 Tabular presentation of the 3 component solution from PCA

		Component	1	2	3
Responsiveness factors	Q1	responsiveness	0.924		
	Q3	procure higher reliability	0.822		
	Q2	procure higher competency	0.819		
	M2	increase the speed of implementation	0.616		
Management factors	M3	function difficult to manage		0.865	
	M1	need for specialized management		0.784	
	Q4	ensure the responsibility		0.669	
	M4	improved management control		0.610	
Quality factors	Q5	improve service quality			0.921
	T1	acquire new skills or technical knowledge			0.590
Eigen values			5.366	1.163	1.045
Percent of variance explained			53.656	11.632	10.452
Cumulative percent of variance explained			53.656	65.288	75.739

Notes: Extraction method: Principal Component Analysis (PCA). Rotation method: varimax with Kaiser normalization. Rotation converged in 5 iterations. KMO measure of sampling adequacy = 0.834. Bartlett's test of sphericity X = 1.989E3; df = 45; sig. = 0.000. Factor loading of an absolute value < 0.4 were suppressed.

than 200 patient beds, and also must have the Hospital Accreditation Institute of Thailand (HA) or Joint Commission International Accreditation (JCI). The 35 questionnaires were distributed to the top largest and wellness 35 companies of hospital by launching through email, by hand, or face to face discussion. The 31 managers, 3 deputy/assistant managers, and 1 supervisor were surveyed as respondents. They have considerable experience, e.g. 77%

respondents have more than 10 years of experience in the BOM field.

2.3 Data analysis

The methods of analyses mainly consist of RII, and FA. The RII was computed to determine the perceptions of respondent. After that, these results can identify the most 10 of important factors to proceed the next steps of analysis. The FA is a statistical tool used to reduce a large amount of data to a small number of factors [7].

3. Results and discussions

3.1 The most important decision factors

From the Table 1, the factor groups of quality, management, technological, strategic, function characteristics, and economical have been ranked by the respondents in the first to sixth position, responsively. These results show how the perceptions of hospital managers decide the outsourcing BOM services. The hospital building has many areas of crucial access points to the healthcare system which high patient demand and too much complicated equipment. So the quality and management are importance factors that the managers have to recognize when they outsourced the BOM services for supporting the several treatment and care mission. Moreover, the technology training was required for staffs to operate and maintain the equipment [5]. The outsourcing also could be the part of strategic to effectively manage the process of business (short-term to long-term). Outsourcing BOM services can help to improve the function and characteristics of hospital operation. Indeed hospital business may decide to save expenses as much as possible. However, it can affect the quality of services to patients [1] and finally economical issues were decided into the last important factors. Then, the top 10 of outsourcing decision factors were selected to category by FA.

3.2 The categorized groups for decision factors

The FA results indicate the 3 new groups of factors with the KMO measure higher than 0.5 that are showed in Table 2 and interpreted as following:

3.2.1 Component 1: responsive factors

For the keys of quality in hospital that are early and correct diagnosis accompanied by appropriate and timely treatment [4]. The responsiveness influencing these key qualities are important for quality in health care. The ideal situation for the patient would not be having to wait for a treatment, this however would result in low occupancy rates and in high costs for the care provider [1]. Thus, the responsiveness is the important decision factors of hospital to outsource BOM service which relate to quality in service and price of treatment.

3.2.2 Component 2: management factors

With the high expect of patients or clients, the difficult function, the specialized management, the high responsibility, and accurate controlling become important management to hospital business when they decide to outsource the BOM service. As it relates to hospital, that good BOM can be safer and more reliable equipment, less service cost, less equipment downtime, more revenue and more effective use of man power [4]. The outsourcing is the way to help business to consider and arrange the resource, information, and supplier include how buildings, equipment, technology, and other assets are managed.

3.2.3 Component 3: quality factors

Nowadays, the importance of health and quality health care in people's daily lives is widely recognized. So the hospital business has to deliver the quality health care and improve the patient outcomes by the new service and technology [5], especially if the BOM services have low efficiency, it is very difficult to achieve the good quality services. The technologies of hospital like the medical equipment and building component need to ensure that used in the patients care are operational, safe, properly configured to meet the mission of the medical treatment facility and continue to function effectively in a good working condition [4].

4. Conclusions

These results indicate that the quality is the most important perception of hospital managers when they decide to outsource the BOM services. The other factors were also partially and interrelatedly supported to the quality for high efficiency when service the customers. Saving cost is the least important factor because it relates to the care quality of the customers. After applying the top 10 of important decision factors with FA, only 3 groups ("responsive factors", "management factors", and "quality factors") were most likely to affect in decision of outsourced BOM services. The findings of this research were not only to understand the decision factors of hospital business but also to assist outsourced BOM service companies to identify and improve the supporting performance for businesses.

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6. References

[1] Thorwarth M. A simulation-based decision support system to improve healthcare facilities performance – elaborated on an Irish emergency department [dissertation]. Dublin: Dublin Institute of Technology; 2011.

[2] Fersht P, Filippone T, Aird C, Sappenfield D. The evolution of global business services: enhancing the benefits of shared services and outsourcing. Massachusetts: HfS Research; 2011.

[3] Assaf S. Factors affecting outsourcing decisions of maintenance services in Saudi Arabian universities. Property Management 2011;29(2):195-212.

[4] Mikkelsen Y. Exploring physicians' decision making and perception of quality in health care delivery [dissertation]. Cranfield: Cranfield University; 2013.

[5] Mutia D, Kihiu J, Maranga S. Maintenance management of medical equipment in hospitals. Industrial Engineering Letters 2012;2(3):9-19.

[6] Suweero K, Moungnoi W. A Review of Outsourcing Decision Factors of Building Operation and Maintenance Services in Commercial Sector.

Proceedings of the Asian Conference on Civil, Material and Environmental Sciences; 2013 Mar 16-17; Tokyo, Japan. Taiwan: Higher Education Forum; 2013. p. 1430-1444.

[7] Yu QZ, Ding LY, Zhou C, Luo HB. Analysis of factors influencing safety management for metro construction in China. Accident Analysis and Prevention 2014;68: 131-138.