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Selecting Outsourcing Strategies in Single Level Bidirectional Service Supply Chain: A Proposed Approach

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Abstract

The purpose of this paper is to propose an approach for selecting outsourcing strategies in single level bidirectional service supply chain. For this purpose, analytic hierarchy process (AHP) technique has been used for selecting two factors that have maximum influence on service outsourcing decisions. Selected factors have been integrated with quadrant analysis for selecting outsourcing strategies. Two questionnaires have been developed to indicate the importance and correlation of objectives of outsourcing and choosing factors that have influence on service outsourcing decisions in the selected service supply chain of a hospital in Isfahan, Iran. Questionnaires have been fulfilled by senior managers and supervisors the hospital. The results indicate that customer contact and relative capability position in the process have maximum affect on service outsourcing decisions in the selected service supply chain and when relative capability position in the process is high, it is better for the decision makers to keep process internal, i.e. in-sourcing since it provides more competitive advantages.

Key words: Outsourcing; Service Supply Chain Management (SSCM); Health care; AHP; Quadrant Analysis

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INTRODUCTION

Outsourcing is a pervasive business practice in which one company (the client) hires another company (the service provider) to perform a particular function on its behalf (Mohr et al., 2011). With an increase in globalization more and more firms outsource not only their production processes, but also their service processes (Lee and Kim, 2010). Outsourcing is a critical strategic decision in a number of organizational functions such as accounting, information systems management, human resources management, supply chain management and manufacturing (Varadarajan, 2009). For the first time, the term of outsourcing was used to describe the Kodak Company to transfer one of its information technology activities to subsidiary of IBM, in 1989 (Lonsdale and Cox, 2000). Since the early 1990s, outsourcing has been discussed under diverse aspects in both academic business studies and operational practice (Holcomb and Hitt, 2007; Lacity et al., 2008; Weimer and Seuring, 2009). A survey of 300 executives worldwide involved with outsourcing services showed only 34 percent out of them gained innovative or transformative ideas from outsourcing (Deloitte, 2008). Some studies show that outsourcing allows a firm to not only cut costs, but also focus on its core competences and help speed up its innovation processes (Florin et al., 2005; Graf and Mudambi, 2005).

Services are motivated by the evolution of the world's economies. Developed economies of the world have continued their evolution to becoming predominantly service-based. Services now account for two-third of the output of the advanced economies of the world (Kelly, 1997). With the fast developing world economy and global marketplace, there has been a drastic increase in the pressure on organizations to find new ways to create and deliver value to customers through supply chain management. Service Supply Chain Management (SSCM) is an analogous system approach that is especially suitable for delivering mobile services such as parcel delivery

and home health care (Shahin, 2010). There has been a growing recognition of building relationship with the customer for improvements in profitability and reduced costs in the supply chain (Niraj et al., 2001; Seth et al., 2006). There do not seem to be enough references on SCM in service applications and service supply chains outsourcing. Available references include Sampson (2000), who demonstrated customer – supplier duality and bidirectional supply chains in service organizations; Shahin (2010), who explained customer – supplier duality and addressed particular elements and impacts of SSCM. He emphasizes that SCM in service is more complicated than in manufacturing; Kakabadse and Kakabadse (2001), who analyzed thinking and practice concerning outsourcing in the public services; Banerjee and Williams (2009), who proposed a model that determined the degree to which value – added services can be outsourced. They found key dimensions that influence the degree of outsourcing; and Lee and Kim (2010), who demonstrated implications of service processes outsourcing on firm value. They found that outsourcing in general creates positive firm value.

As it is apparent, research on service supply chains outsourcing is limited. Thus the purpose of this paper is to propose an approach for selecting outsourcing strategies in service supply chains. In the following, literature of outsourcing, its evolution, reasons of outsourcing and factors effecting outsourcing decisions in service organizations are addressed. SSCM and different types of service supply chains are also demonstrated; then, the new methodology is proposed and findings of the case study are discussed and major conclusions are derived.

1. OUTSOURCING

Nowadays with increasing competitive pressures and progressing globalization, firms have to reduce their costs and build new opportunities via optimized using of internal and external resources (Mahmoodzadeh et al., 2009). Outsourcing describes the use of external resources to execute operational tasks (Grover et al., 1994). After the first wave of outsourcing with a primary emphasis on manufacturing activities in the 80s and 90s, more firms have begun to outsource service processes including information technology and business processes, resulting in the second wave of outsourcing (Lee and Kim, 2010).

1.1 Objectives of Outsourcing

In a number of investigations the reasons of outsourcing have been studied. For example, Kotabe et al. (2008) outlined different arguments to explain why firms would want to outsource. These reasons include strategic focus, lower production costs, strategic flexibility, avoiding bureaucratic costs and rational rent. In another study it was emphasized that while cost reduction is important, it is only one of the objectives expected from outsourcing and other objectives include improved flexibility, quality and control (Quelin and Duhamel, 2003). Brown and Wilson (2005) stated that most important reasons of outsourcing include acquiring new skills, better management, focus on strategy, focus on core functions, avoid major investments, assist a fast-growth situation, handle over flow situation, improve flexibility, improve financial ratios, reduce costs, improve overall performance and enhance credibility.

1.2 Factors Influencing Outsourcing Decisions

In a number of studies the factors affecting outsourcing decisions are studied. For example, McIvor (2008) proposed a practical framework that managers can use to identify suitable outsourcing strategies. The framework provides a mechanism for understanding which processes should be kept internal and which should be outsourced based on relative capability position and contribution of the process to competitive advantage. Collier (1985) suggests that legal restrictions, technical capabilities and cultural norms also should be considered when deciding to outsource (Balakrishnan et al., 2008). Ashrafzadeh (2003) addressed factors affecting service outsourcing decisions as customer contact, intangible nature of services (service intangibility), standardization process, demand uncertainty, technology uncertainty, complexity of process and number of suppliers.

For decades, healthcare organizations have outsourced services such as food service. Today, as managed care programs attempt to reduce healthcare costs, providers are turning to outsourcing in new ways in an effort to maintain high standards of care (Sarpin and Weideman, 1999). Moschuris and kondylis (2006) stated that factors affecting outsourcing decisions in public hospitals include customer satisfaction, focus on core business, flexibility of process, lack of funds and lack of personnel.

2. SERVICE SUPPLY CHAIN MANAGEMENT

SSCM is an analogous system approach that is especially suitable for delivering mobile services such as parcel delivery, cable installation, and home health care. The key elements that distinguish SSCM from SCM are bidirectional optimization, perishability, and simultaneous management (Shahin, 2010). Service supply chains, unlike physical goods supply chains, often involve the customer as an active participant in the production process (Sampson, 2000). All services act on something which is provided by the customer. The implication is that all services have customers as primary suppliers of inputs. In other words, customers are suppliers in most of service businesses and this implies the customer-supplier duality (Shahin, 2010).

2.1 Different Types of Service Supply Chains

Customer-supplier duality implies that production flows not only from suppliers to customers, but also from

customers to suppliers. Therefore, production flow is bidirectional, which is a key factor in linking traditional supply-chain concepts to service process realities (Sampson, 2000). The simplest form of a bidirectional supply chain is for the customers to provide their inputs to the service provider, who converts the input into an output which is delivered back to the customers. This single-level bidirectional supply chain is depicted in Figure 1.

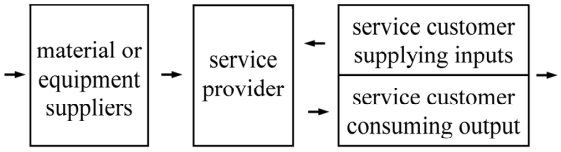

Figure 1
Single-Level Bidirectional Supply Chain (Sampson, 2000; Shahin, 2010)

Things get more complicated when the service provider employs another service provider to assist with the processing of customer inputs. The result is a two-level bidirectional supply chain. Such a two-level bidirectional supply chain is depicted in Figure 2. In two-level bidirectional supply chains, the initial service provider is an interface between the service customer and the service supplier.

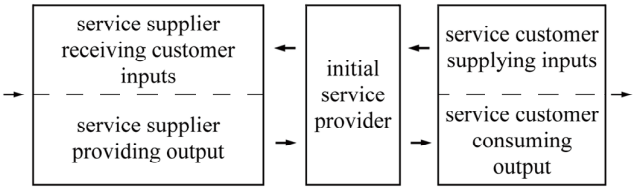

Figure 2
Two-Level Bidirectional Supply Chain (Sampson, 2000; Shahin, 2010)

There is a third type of service supply chain that is not bidirectional, but incorporates the customer-supplier duality. This is a class of service processes in which the customer provides inputs to the service provider, who processes the inputs and delivers them to an entity which is different from the customer. Even if the original customers never see the original delivered output, they do receive benefits from the delivery. An example is postal or package delivery, where customers deliver their documents/packages to the delivery service provider to be spatially transformed (i.e., moved) to a desired location (Sampson, 2000; Shahin, 2010).

3. ANALYTIC HIERARCHY PROCESS (AHP)

AHP is a problem-solving framework and a systematic procedure for representing the elements of any problem (Saaty, 1983). It was initiated by Saaty (1980) and is popular and widely used. AHP involves three steps. The first step is to structure the problem into a hierarchical framework with successive levels of goals, criteria and alternatives. The alternatives are placed at the bottom level. Such structuring requires experience with the AHP technique, while the following guidelines are helpful:

• Start structuring top down – specify an overall goal first, then criteria and the alternatives that have an impact on the goal, or will help to achieve that goal.

• Comparison analysis: Once the hierarchy has been structured, the next step is to establish ratio priorities for each node of the hierarchy. This comparison analysis is generally conducted from bottom to top. Once sufficient comparisons have been made for a node, the principal eigenvector of the comparison matrix is standardized, so that it sums to one and becomes the ratio measure of the relative importance of each item. Since these priorities reflect the relative importance of just the items below a parent node, they are called local weights.

• Aggregate the local weights into a composite priority – This is the AHP's final step and is done through the principle of hierarchic composition that first multiplies local weights by the result of all higher-level priorities. Within the hierarchy, this process transforms the local weights into global weights that measure the importance of each node in the total hierarchy. These global weights are then summed for a specific alternative to yield a composite priority that measures the joint impact of all of the criteria. Then, the alternative with the highest weight is selected (HajShirmohammadi and Wedley, 2004; Shahin and Mahbod, 2007).

4. RESEARCH METHODOLOGY

The objective of this paper is to propose an approach for selecting outsourcing strategies in service supply chains. For this purpose, a survey is conducted in the following steps:

Step 1: Defining objectives of outsourcing

It is assumed that the objectives of outsourcing are its criteria. Criteria are determined based on literature review and some of the references include Que'lin and Duhamel (2003), Brown and Wilson (2005) and Kotabe et al., (2008). It should be noted that a number of criteria has had similar definition and are combined under one title. For instance, it is assumed that strategic focus, focus on strategy and focus on core functions are almost the same and respectively, strategic focus is used for them. The criteria include:

- Improve flexibility: When a function experiences large swings in the volume of work it handles, it may be easier to eliminate the fixed cost of an internal staff and move the function to a supplier that will be paid only for the work done. This converts a fixed cost into a variable cost. Generally, outsourcings enhance strategic flexibility of organization.

- Reduce costs.

- Improve quality.
- Improve control.
- Strategic focus: Outsourcing the tactical part of each manager's job to a supplier allows the managers to spend more time on such strategy-related issues as market positioning and new product development. A company that has a very small number of functions as key to its survival may want to focus all of its energies on those functions and distribute all other functions among a group of outside suppliers so that company management is free to manage.
- Improve financial ratios: Outsourcing a function that involves transferring assets to suppliers will increase the company's return on assets.
- Enhance credibility: A company can enhance its credibility by contracting with highly reputable outsourcing suppliers.
- Assist a fast-growth situation: If a company is rapidly acquiring market share, the managers will be stretched to its limits in handling the increased volume of business. In such situations, the managers will desperately need additional help in running the firm. A supplier can step in and take over a function, freeing the managers to focus on core activities.
- Acquire new skills: A company may find that the skill set of its in house staff is inadequate for a given function. A company can solve this problem by outsourcing.

Step 2: Defining factors influencing service outsourcing decisions

In this paper, alternatives are assumed to be the factors influencing service outsourcing decisions. They are determined based on previous research, such as Collier (1985), Ashrafzadeh (2003), Moschuris and kondylis (2006) and McIvor (2008). They include:

- Relative capability position in the process: Processes that are critical to competitive advantage have a major impact upon the ability of an organization to achieve competitive advantage either through, create higher levels of differentiation than competitors.
- Contribution of the process to competitive advantage: A key issue in competitive strategy includes understanding why one firm differs in performance from another. Some organizations gain advantage over others because they can conduct certain organizational processes in a superior manner relative to their competitors.
- Legal restrictions.
- Customer contact: customer contact is defined as the ratio of time during which a customer is in direct contact with the service facility to the total time required for the creation of the service.
- Intangible nature of services: Services are ideas and concepts. Therefore, it allows that services are not patentable. The intangible nature of services presents a problem for customers. When buying a product, the customer is able to see it. For a service the customer must rely on the reputation of the service organization.
- Standardization process: standardization refers to the process of developing an international standard that enables organizations to focus their attention on delivering excellence in customer service.
- Demand uncertainty.
- Technology uncertainty.
- Complexity of process.
- Number of suppliers.
- Customer satisfaction.
- Focus on core business.
- Flexibility of process.
- Lack of funds.
- Lack of personnel.

Step 3: Selecting a service supply chain.

In order to indentify outsourcing strategies in service supply chains, a single level bidirectional supply chain is selected as the case study of this paper.

Step 4: Developing the AHP hierarchy.

Step 5: Calculating the total weight.

Step 6: Selecting two alternatives with maximum weight.

Step 7: Quadrant analysis based on the two factors selected in step 6.

Step 8: Defining outsourcing strategies for the selected service supply chain.

5. CASE STUDY AND FINDINGS

One of the public hospitals in Iran is selected as the case study. In order to indentify outsourcing strategies in service supply chains, a single–level bidirectional supply chain is selected. In fact the hospital's dentistry process which is in accordance with the single–level bidirectional supply chain depicted in Figure 1 is selected for analysis.

In order to study the importance and correlation of variables (the criteria addressed earlier), a questionnaire is developed as presented in Appendix 1. Five point Likert scale is considered for the options of answers (1="strongly low"; 2="low"; 3="medium"; 4="high"; and 5="strongly high").

In order to study the influence of the factors on dentistry outsourcing, another questionnaire is developed as addressed in Appendix 2. The answers are considered to be given as yes or no.

The validity of the questionnaires is proved using Delphi technique in which 12 university scholars and 30 hospital's managers involved. The reliability of the data is measured using Cronbach's alpha which is equal to 0.725 and 0.75 for the first and the second questionnaires, respectively and seem satisfactory.

The first questionnaire is filled by senior managers and supervisors of the hospital. Five senior managers and eight supervisors filled the questionnaires (Altogether, 13 respondents). Spearman correlation test is used to analyze the correlations of variables. Summary of the results are represented in Table 1.

Table 1
Summary of the Results of Spearman Correlation Test

Variables		Improve control	Improve financial ratios	Assist a fast-growth situation	Acquire new skills
Improve control	Correlation Coefficient	1	0.855**	.014	-0.088
	p- value	-	0	0.965	0.776
Improve financial ratios	Correlation Coefficient	0.855**	1	0.276	0.152
	p- value	0	-	0.361	0.62
Assist a fast-growth situation	Correlation Coefficient	.014	0.276	1	0.819**
	p- value	0.965	0.361	-	0.001
Acquire new skills	Correlation Coefficient	-0.088	0.152	0.819**	1
	p- value	0.776	0.62	0.001	-

The second questionnaire is also filled by the senior managers and supervisors of the hospital. Five senior managers and 10 supervisors filled the questionnaires (Altogether, 15 respondents). Binomial test with confidence level of 0.95 is used to analyze and show factors which influence dentistry outsourcing. Summary of the results are represented in Table 2.

Table 2
Summary of the Results of Binomial Test

Factor	Test prop	P- value	Factor	Test prop	P- value
Customer satisfaction	50	0	Legal restrictions	50	0.302
Intangible nature of services	50	0.302	Lack of personnel	50	0.035
Standardization process	50	0.035	Relative capability position in the process	50	0.001
Demand uncertainty	50	0.302	Number of suppliers	50	0.001
Technology uncertainty	50	.0302	Flexibility of process	50	0.118
Complexity of process	50	.0607	Lack of funds	50	0.035
Customer contact	50	0.035			
Focus on core business	50	0.007			
Contribution of the process to competitive advantage	50	0.035			

According to the results of Binomial test, factors that have p-value greater than 0.05 are omitted and other factors will be used for the AHP model as alternatives. Also, considering the results of Spearman correlation test, there are significant correlation between improve control and improve financial ratios and between assist a fast-growth situation and acquire new skills, with p-values smaller than 0.05. Finally, correlated factors are combined and respectively, improve control and acquire new skills are used as criteria for AHP (Figure 3).

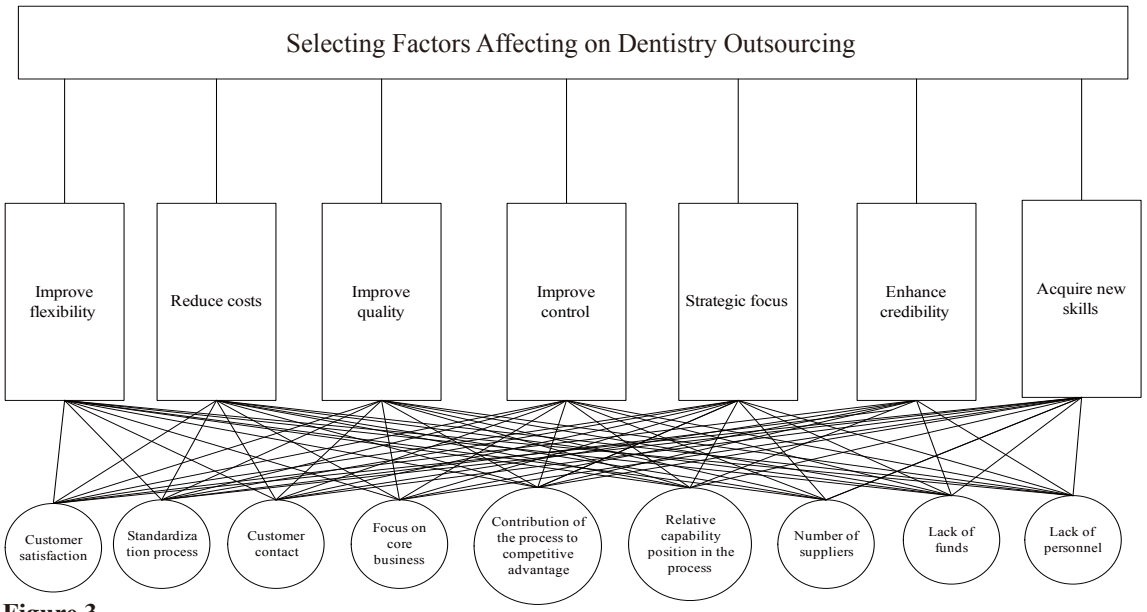

Figure 3
The Structure of the AHP Technique

In order to select two factors with maximum influence on dentistry outsourcing, pair wise comparisons are applied among the criteria and among alternatives based on Saaty's 1-9 scales. The judgments are carried out by four managers of the hospital. Then geometric means of judgments are calculated. Judgment consistency is calculated by using the consistency ratio (CR). The averaged judgment matrix is then determined by the geometric mean of each row in the pair wise comparison matrices and the weights are calculated. It is important to note that the pair wise comparison matrices of this paper become too large and therefore, they could not be illustrated in this paper. Saaty (1990) used the principal eigenvector of the comparison matrix to find the comparative weights among the criteria of hierarchy systems. For each $n \times n$ pair wise comparison matrix A, by using the eigenvector theory, i.e. $(A - \lambda_{max} I) = 0$, to calculate the eigenvalue λ_{max} and the eigenvector $w(w_1, w_2, \cdots, w_n)$, the weights of the criteria can be estimated. To measure the degree of consistency of the intuitive judgment, Saaty suggested using the consistency index $CI=(\lambda_{max} - n)/(n - 1)$. When the consistency degree is calculated, the result is compared with those of the same index of a randomly generated reciprocal matrix from a scale of 1-9, with forced reciprocals. This index is called the random index (RI). In the test of CR, the comparison value of CI and RI ($CR = CI/RI$) is used and a CR of 0.10 or less is considered as a positive evidence for informed judgment.

Generally, the total score of alternatives (factors) is calculated by the following equation (step5):

$$E_i = \sum_{j=1}^{7} (A_{ij} \times w_j), i = 1,..,9$$

Where E_t = Total score of alternatives; A_{ij} = Score of alternative i on criteria j; w_j = weight of criterion j; i = alternative index; and j = criterion index.

The results of total score of alternatives, i.e. factors which influence dentistry outsourcing are computed using the Excel software and are presented in Table 3.

Table 3
Total Score of Alternatives (factors)

Factor	Score
Customer satisfaction	0.12
Standardization process	0.06
Customer contact	0.14
Focus on core business	0.10
Contribution of the process to competitive advantage	0.10
Relative capability position in the process	0.19
Number of suppliers	0.11
Lack of funds	0.11
Lack of personnel	0.08

According to Table 3, relative capability position in the process and customer contact have maximum weight values (i.e. 0.19 and 0.14) and they should be selected for quadrant analysis (step 6).

In the next step, the two addressed factors are used for quadrant analysis. This analysis provides a framework for selecting outsourcing strategies in the dentistry process (Figure 4).

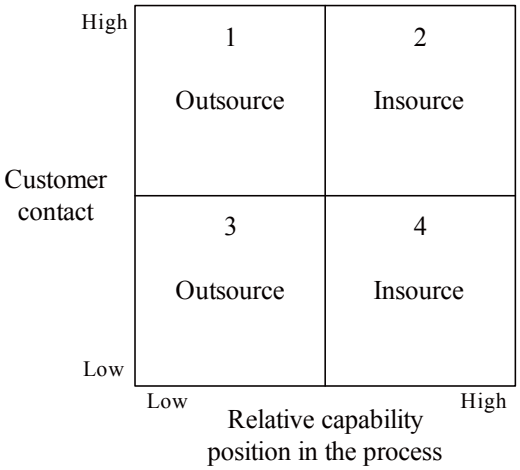

Figure 4
Quadrant Analysis for Selecting Outsourcing Strategies

In quadrant 1, customer contact is high and relative capability position in the process is low. Suitable strategy is to outsource the process. In quadrant 2, both customer contact and relative capability position in the process are high. Suitable strategy is to keep process internal (insource). In quadrant 3, both customer contact and relative capability position in the process are low. Suitable strategy is to outsource the process. Finally, in quadrant 4, customer contact is low and relative capability position in the process is high. Organization has ability to achieve competitive advantage because of relative capability position in the process is high. Therefore, suitable strategy is to keep process internal (insource).

DISCUSSION AND CONCLUSIONS

In this paper, a new approach was proposed for selecting outsourcing strategies for a single level bidirectional supply chain in a hospital. Two questionnaires were developed in order to select criteria of outsourcing and factors influencing service outsourcing decisions. Questionnaires were fulfilled by senior managers and supervisors of the hospital. According to the results, factors influencing dentistry outsourcing included customer satisfaction, customer contact, standardization process, focus on core business, contribution of the process to competitive advantage, relative capability position in the process, number of suppliers, lack of fund and lack of personnel. These factors are more similar to the factors introduced by Moschuris and kondylis (2006). Customer contact and standardization process are similar to the factors suggested by Ashrafzadeh

(2003). In comparison with Collier (1985), the factor of legal restrictions was not assumed to have influence on outsourcing strategies. While McIvor (2008) determined factors of contribution of the process to competitive advantage and relative capability position in the process for quadrant analysis, in this paper, customer contact and relative capability position in the process were found as having maximum influence on dentistry process and were selected for quadrant analysis and defining outsourcing strategies.

Analytic hierarchy process (AHP) was used to facilitate the prioritization of factors influencing service outsourcing. It allowed diverse viewpoints to be considered and integrated ensuring that all participants have input to the final evaluation. While in AHP it is assumed that all criteria are independent, this precludes interactions among the criteria. One of the advantages of AHP is its capability and flexibility in changing the weights in different circumstances and thus, the new approach is easily adaptable with diverse areas of application. It is important to note that rating scales used in the AHP analysis are conceptual, further investigation is needed to enhance this part of methodology. It is important to note that variation in the views of people who are responsible for rating the weight of factors influencing service outsourcing might lead to a result that is not certain.

In addition to the strategies derived from the quadrant analysis, it should be noted that an organization (e.g. the hospital in this paper) can choose two ways for outsourcing its process:

- Making short-term contract with a supplier (e.g. one year), by which the organization will have better control on supplier and more desirable quality will be achieved. Organization can concentrate on developing the supplier and supplier will be more committed to the organization. However, this option may have the risk of buyer-supplier relationships.

- Making close and long-term contract with more than one supplier. In this case, organization can avoid the risk that may be posed by one supplier. This option will provide competition between suppliers for delivering best quality and service. However, the organization might not have control on all suppliers.

It is important to note that the quadrant analysis should be filled by the top manager of hospital, since he/she is the person who will finally decide on insourcing/outsourcing of the process.

The case study was limited only to one type of service supply chains, i.e. a single level bidirectional service supply chain. Therefore it is suggested to researchers to study and examine the proposed approach including its steps in other types of service supply chains and to compare the results with the findings of this study. Furthermore, the case study was limited to one hospital and studying the applicability of the proposed approach in a wider range of hospitals provides a good opportunity of future study.

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Appendix 1

This questionnaire is developed to determine the criteria of outsourcing in the hospital. Proposed variables might have strongly low, low, medium, high and strongly high importance. Please mark the suitable option for each question.

Demographic characteristics

Organizational Duty: …….

Years of experience since employment: ……

Under10 years ☐ 10-20 years ☐ 20 -30 years ☐

Education: B.S ☐ M.S ☐ PHD ☐

Gender: Male ☐ Female ☐

Age: 20-30 years old ☐ 30-40 years old ☐ above 40 years old ☐

Question: How much is the Importance of the Following Criteria of Outsourcing?

No.	Variables	Strongly low	Low	Medium	High	Strongly high
1	Improve flexibility					
2	Reduce costs					
3	Improve quality					
4	Improve control					
5	Strategic focus					
6	Improve financial ratios					
7	Assist a fast- growth situation					
8	Enhance credibility					
9	Acquire new skills					

Appendix 2

This questionnaire is developed to determine factors influencing dentistry outsourcing decision. The proposed factors might have strongly low, low, medium, high and strongly high importance. Please mark the suitable option for each question.

Demographic characteristics

Organizational Duty: ……

Years of experience since employment: ……

Under10 years ☐ 10-20 years ☐ 20 -30 years ☐

Education: B.S ☐ M.S ☐ PHD ☐

Gender: Male ☐ Female ☐

Age: 20-30 years old ☐ 30-40 years old ☐ above 40 years old ☐

Question: Do the Following Variables Influence Outsourcing of the Dentistry Process

No.	Factors	Yes	No
1	Relative capability position in the process		
2	Contribution of the process to competitive advantage		
3	Customer contact		
4	Intangible nature of services		
5	Standardization process		
6	Demand uncertainty		
7	Technology uncertainty		
8	Complexity of process		
9	Number of suppliers		
10	Customer satisfaction		
11	Focus on core business		
12	Flexibility of process		
13	Lack of funds		
14	Lack of personnel		
15	Legal restrictions		