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Outsourcing Maintenance Activities or Increasing Risks? Case Study in Oil Industry of Iran

Dr.Majid Nili
Department of Management, Najafabad Branch, Islamic Azad University, Isfahan, Iran

Dr.Ahmadreza Shekarchizadeh
Department of Management, Najafabad Branch, Islamic Azad University, Isfahan, Iran

Reza Shojaey
Department of Management, Najafabad Branch, Islamic Azad University, Isfahan, Iran

Mohsen Dehbanpur
Department of Maintenance, Aghajari Oil and Gas Production Company

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Abstract

Purpose: The objectives of this Research are to identify the the Potential risks and Expected outsourcing benefits influencing the decision making to outsource maintenance Activities in Aghajari Oil and Gas Production Company (Aj.O.G.P.C), and to investigate the relative importance of each of the identified factors based on the expressed opinions of the mangers and head employee in the Aj.O.G.P.C.

Design/methodology/approach: The authors conducted a comprehensive review of the literature in the fields of maintenance management and outsourcing practices to achieve a thorough understanding of the issues involved, and identifying the crucial factors and the Potential risks and Expected outsourcing benefits affecting the outsourcing decision of maintenance Activities. A questionnaire survey was developed to assess each the Potential risks and expected outsourcing benefits influencing the decision to outsource maintenance services between 182 managers and head employee of the Aj.O.G.P.C.

Tests performed include: The mean test, The T test, Friedman test, The T test (Two samples).

Findings: The findings show that Aj.O.G.P.C generally value the importance of the strategic factors when making outsourcing decisions. The most important Expected outsourcing benefits were identified as" Freeing resources for core activities " and The most

important Potential risks were identified as" Dependence on the service provider". The findings of T test (Two samples) show that the Potential risks is greater than the Expected outsourcing benefits.

Practical implications: The findings of the study provide practical value for managers in institutions of Aj.O.G.P.C confronted with the decision of whether to outsource maintenance Activities in their Organization.

Keywords : *Outsourcing, Decision making, Maintenance Activities, Aj.O.G.P.C*

1. Introduction

1.1: Aghajari Oil and Gas Production Company (Aj.O.G.P.C.) Aghajari Oil and Gas Production Company is one of five companies subset of the N.I.S.O.C. that is responsible for leading production operations, oil and gas processing and transmission with the principles of protecting the tanks with continuous activity in 45 operational units of the eight field (Aghajari, Krnj, Prnj, Parsi, Ramshir, Ragsefid 1, Pazanan 1 and Maroon), With 12 units in operation, 8 gas plants and liquid natural gas ,18 Compressor Station and Gas Injection, 4 desalination unit and Product 25% percent oil of the N.I.S.O.C.

1.2: Outsourcing is a common practice among both private and public organizations and is a major element in business strategy. Perhaps most organizations now outsource some of the functions they used to perform themselves. (Kremic et al. 2006).

We have focused on the industrial maintenance Outsourcing perspective. Maintenance is a critically important function of any business that is dependent on physical assets for producing products or providing services.

A vast amount of research has been done on the benefits and risks of outsourcing (e.g. Lacity et al. 2008; Yang et al. 2007; Kremic et al. 2006; Garg and Deshmukh 2006; Bailey et al.2002; Gilley and Rasheed 2000).Organizations may expect to achieve many different benefits through successful outsourcing, although there are significant risks that may be realized if outsourcing is not successful. In certain cases there is a good business case for outsourcing some of the maintenance to an external party. This research project assessed numerous benefits and risks associated with maintenance outsourcing. The following aspects of outsourced maintenance were investigated:

-What are the benefits of maintenance outsourcing?
-What are the risks involved?

A literature study was performed to provide answers to the first two questions. A field survey was then conducted to verify these answers. The decision whether to outsource this vital support service is a complex one. It involves the investigation of a multitude of factors on the strategic, tactical or managerial as well as the operational levels. The findings of the study would provide practical value for managers in institutions of Aj.O.G.P.C confronted with the decision of whether to outsource maintenance Activities in their Organization.

2. Research methodology

To achieve the objectives of this the research, the authors have carried out several research activities, including:

(1) Reviewing the current literature in the fields of maintenance management and outsourcing practices to achieve a thorough understanding of the issues involved, and identify the Potential risks and Expected outsourcing benefits affecting the outsourcing decision of maintenance services.

(2) Developing a questionnaire survey to assess each the risks and benefits influencing the decision to outsource the maintenance services in Aj.O.G.P.C.

(3) Pilot-testing the developed questionnaire survey through conducting interviews with the maintenance department managers Aj.O.G.P.C.

(4) Obtaining responses on the developed questionnaire survey from each of the department managers. The 5 departments are Operations management department, Technical management department, Financial management department, Human Resources management department and Services management department were considered as subject matter experts in the domains of outsourcing practices.

(5) Analyzing the data obtained from the questionnaire survey using the statistical analysis method (of spss 19) to identify the level of importance for each of the risks and benefits .

(6) Ranking each of the identified risks and benefits according to its perceived significance by the respondents of the questionnaire survey.

(7) Test the hypothesis of no difference between the risks and benefits with Paired-Samples T Test procedure by spss19.

3. Review of literature on the outsourcing of maintenance activities

Before the 1970s, outsourcing was adopted only to reduce costs (McIvor et al., 1997). Lankford and Parsa (1999) stated that outsourcing is usually supported by many factors in all organization levels. The decision to outsource should take account of many issues: scale of economy, outsourcer expertise, strategy, the need for cost savings, accountability with greater control of operating costs, moving from fixed into variable costs, and quality factors. Several studies have been completed on various aspects of outsourcing.

Arditi and Nawakorawit (1999) conducted a survey of 230 property management organizations in the US to examine their maintenance practices. The reported results focused on the policies concerning outsourcing and in-house maintenance services. The findings indicate that corrective maintenance, service maintenance, and deferred maintenance are mostly performed through selective outsourcing. Further, routine maintenance and preventive maintenance are mostly performed by in-house staff. Moreover, extraordinary

maintenance is mostly performed by contractors. Cleaning of the interior and exterior of buildings is performed through full outsourcing. Inspection, repair and replacement of building components are performed by selective outsourcing.

Industrial maintenance has undergone a remarkable structural change, which includes two different aspects: firstly, the attitudes of company decision-makers towards maintenance have changed, and secondly the maintenance activities of industrial companies get outsourced more and more often to outside service providers. Maintenance is no longer seen as a mere cost pool by industrial companies, it is understood instead that critical competitive edge can be reached through comprehensive asset management (Al-Turki 2011; Simões et al. 2011; Al- Najjar 2007; Alsyouf 2007; Madu 2000; Löfsten 1999). The increased automation of industrial production has led to higher amounts of capital tied up in production equipment (Alsyouf 2009). In addition, both the number of employees focusing on equipment maintenance and the amount of money invested in maintenance activities have grown (Garg and Deshmukh 2006). Particularly the nature of process industries with continuous production systems highlights the importance of successful proactive maintenance: these kinds of industries are vulnerable to the potential major losses induced by lost production, which can be caused by not allocating enough resources into asset maintenance, or by maintenance actions of poor quality (Arts et al. 1998; Knapp and Mahajan 1998).

While industrial maintenance has received more attention from company decision-makers, it is at the same time one of the services outsourced more and more often to service providers (Tarakci et al. 2009; Quélin and Duhamel 2003). Close competition has increased the practice of industrial companies to focus on their core competences, which rarely include maintenance. Together with many other supportive activities, maintenance gets often outsourced to service companies (Redondo-Cano and Canet-Giner 2010; Espino-Rodríguez and Padrón-Robaina 2006; Kremic et al. 2006; Kumar and Kumar 2004; Kakabadse and Kakabadse 2002; Hendry 1995). Despite the practical significance of maintenance outsourcing, this research area still remains somewhat unexplored in the academic literature.

The study presented the possible benefits, risks, and strategic issues of outsourcing, and highlighted that the iterature lacks guidelines on sustainable decisions and it needs further work.

4. Factors affecting outsourcing decisions

This study on outsourcing maintenance required a theoretical framework that was developed from the available literature and practical experience. Inputs in the development of the framework were expected benefits of outsourcing and potential risks of outsourcing

4.1: Expected benefits of outsourcing

All firms are seeking benefits from the smallest through the greatest activities they commit. Whatever such benefits are to the outsourcer, benefits like economic savings, flexibility, and concentration on core-competencies are among the main benefits that come to our minds

first. These benefits were classified under five groups, including strategic, management, technological, economical and quality factors that illustrates as Figure 1.

Previous literature has partly considered the benefits of outsourcing from the maintenance point of view, for example Quélin and Duhamel (2003) state that the main reasons for maintenance outsourcing are cost savings, focusing on value-adding activities, and access to external know-how. However, most outsourcing research has been done on a more general level. We have collected the most relevant outsourcing benefits that are also applicable to maintenance outsourcing, using the previous literature.

Focus on core activities. The most strategic factor influencing the outsourcing decision is to allow the organization to focus on its core activities (Sislian and Satir, 2000). By focusing on core activities, an organization can support its position for a competitive advantage. The decision on exactly what function is core should have bearing on whether or not to outsource them. This view assumes that there is no strategic competitive advantage to retaining control of the property functions. (Assaf, 2011)

Improve flexibility to the changing market dynamics. Flexibility, which is a strategic factor, includes operational flexibility, resource flexibility, and demand flexibility (Kremic et al., 2006). The potential for improved flexibility is measured by the organization's ability to change the service range in response to market conditions (Jennings, 2002). In today's rapidly changing world, an organization has to respond quickly to changing customer demands. Outsourcing helps the organizations to be flexible by providing reliable workers to reduce the time needed to complete works (Djavanshir, 2005).

Increase the speed of implementation. Some services such as corrective maintenance need rapid responses to repair failures. Therefore, the speed of implementation is the important factor. Outsourcing enables an organization to put pressure on a contractor to respond to changes because the contractor should have the resources to perform a service in the agreed time (Greaver, 1999).

Function difficult to manage. If a service is complex or integrated, or if there is no qualified management staff, the organization may get appropriate equipment from service provider (Kremic et al., 2006; McDonagh and Hayward, 2000).

Safety management: To avoid loss of life, personal injury, property damage, and to ensure safe and healthful conditions for persons, the use of skilled external management should reduce the exposure to legal liability for accidents that may be occurred in the work situations. It must however be noted that an organization is not able to contract out of its duty of care to occupiers and users of the facility and must maintain adequate risk management procedures to ensure that contracted services are performed. (Assaf, 2011)

Achieve flexibility with changing technology. The growth and change in all aspects of technology necessitates flexibility through constantly monitoring and developing the growth rate to remain competitive. (Assaf, 2011)

Need for specialized expertise. Specialist contractors can afford to advance in new

technologies and innovative practices, because they perform only one service and have all the means to perform it. They can focus on identifying areas susceptible to improvement and on the knowledge needed to act successfully (Alexander, 1996). They are however susceptible to a short-term focus commensurate with the term of the contract for services.

Acquire new skills or technical knowledge. Outsourcing may help an organization to gain new skill and knowledge so that it can afford to develop its expertise to maintain high-level technology. Therefore, when some services are outsourced, an organization should gain new skills or new technical knowledge from the outside supplier (McDonagh and Hayward, 2000).

Save the overall cost. The key driver for many outsourcing decisions is the reduction in the cost of labor, materials, and parts (Lindskog, 2005). The function is outsourced when the in-house costs are higher than the anticipated costs for outsourcing the function. Therefore, the higher the internal cost to perform the function relative to the anticipated cost of outsourcing, the greater the probability of outsourcing (Kremic et al., 2006).

Reduce the labor and operating cost. Costs can be reduced, either by saving on labor costs or by using new technology for efficiency. Djavanshir (2005) stated that the best benefits of outsourcing are in reducing the labor and operating cost, and gaining a competitive advantage. The decrease in labor and operating costs is based on a contractor's experience to perform or provide a certain service more efficiently and effectively. (Assaf, 2011)

Make fixed costs into variable costs. Outsourcing helps an organization to move fixed costs (such as payroll or labor productivity and materials) so that they become variable costs (Anderson, 1997). Costs for operating resources and investments of fixed infrastructure can be reduced step-by-step after the services have been outsourced. Then the payment to the contractor would convert the fixed costs into variable costs (Blumberg, 1998).

Improve cash flow. An organization's cash flow is improving when it has fewer employees, and then it requires less infrastructure and support systems, which may result in greater efficiency by reducing variable cost and managed cost (Fontes, 2000). Some organizations outsource to achieve better cost control that improves the cash flow (Anderson, 1997). Outsourcing has the probability to be long-term if contractors can offer quality services more cost-effectively than in-house (Yik and Lai, 2005).

Cash infusion: Outsourcing is desired when the costs offered by contractors are low enough than the added overhead and profit (Fontes, 2000). All tools, equipment, vehicles, and facilities used in the current operation have value if they improve cash infusion by being transferred to the contractors (Corbett, 1998).

Make capital funds more available for core activities. Reducing the need to invest capital funds in non-core functions, and making them available for core areas, makes organizations sometimes consider outsourcing to increase flexibility in finance and to make capital funds more available for core activities (Djavanshir, 2005;).

Increase economic efficiency. The motivation of outsourcing is sometimes economic, such as scale efficiency (Arino et al., 2001). Organizations that specialize in particular services make a

relatively large business volume, which allows them to take advantage of scale economies and thus to operate and maintain the services more cost-effectively (Quelin and Duhamel, 2003).

Service quality includes quality planning, quality control, quality assurances, and quality improvement. If the organization's service quality is held in high regard, outsourcing the service should be seen as a potential improvement (Anderson, 1997). The quality factors influencing the decision to outsource services, are: reach higher service level, improve service quality, meet special requirements, and achieve competitive advantage. (Assaf, 2011)

Improve service quality. Service quality appears to be an important factor regarding the scope of service. The quality of maintenance work is required to bring facilities and equipment to a condition that meets acceptable facilities maintenance standards. When some services are outsourced, the quality of services should be measured against the standards (Campbell, 1995; Hendrickson, 1998).

Improve quality requirements. The way to gain competition advantage is to outsource non-core activities for improving service requirements so that the outsourcing will help to compete with others. Maintenance requirements continuously change due to wear and tear, technological developments, and changing operational requirements. The quality requirements involve statutory and regulatory compliance with minimum standards of material and implementation (Campbell, 1995; Hendrickson, 1998).

Achieve high quality of service for competitive advantage. When an organization is currently recognized for a high quality, there may be concern by decision makers that outsourcing might affect the quality of services (Kremic et al., 2006). Organizations need to react rapidly to user requirements, and so outsourcing is seen as a means to accomplish high competitive advantage. The availability of contractors encourages organizations to outsource their non-core activities. As a result, the quality of services is improved at a lower cost (Quinn, 2000; Campbell, 1995).

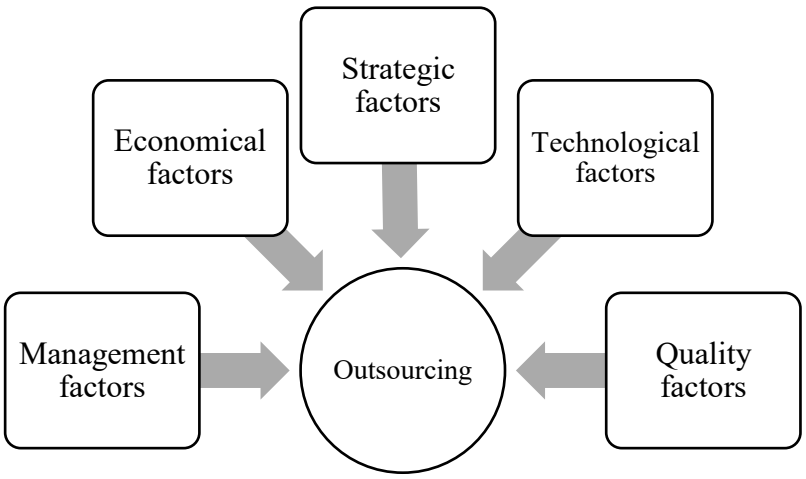

Figure 1: Expected benefits factors of outsourcing

Procure higher reliability and competency. The quality and reliability of processes and services may be improved by engaging a contractor based on past performance (Al-Najjar, 1996). Strategy for service quality needs to reflect the organization's position to develop competitive advantage and higher reliability through the services that it offers. The high quality of services establishes reliability and can generate satisfaction for users (Kremic et al., 2006).

Rather than discussing potential benefits individually in detail, they are summarized in Table I along with a list of references From 2000 to now.

Table 1: Expected outsourcing benefits

Expected benefits	Referent researches
Cost savings	Adler (2000), Fan (2000), Kakabadse and Kakabadse (2000a), Krizner (2000), Laarhoven et al. (2000), Bailey et al. (2002) , Lindskog (2005), Djavanshir (2005), Kremic et al. (2006), Yang et al. (2007), Assaf et al. (2011), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Reduced capital Expenditures	Kakabadse and Kakabadse (2000a), Assaf et al. (2011), Tajdini and Nazari (2012)
Capital infusion	(Fontes, 2000). (Djavanshir, 2005, Assaf et al. (2011),Tajdini and Nazari (2012)
Transfer fixed costs to variable	(Fontes, 2000 ,Kakabadse and Kakabadse (2000a), (Yik and Lai, 2005), Assaf et al. (2011),Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Increase economic efficiency	Arino et al.(2001),Quelin and Duhamel, (2003), Assaf et al. (2011), Tajdini and Nazari (2012)
Quality improvement	Jennings (2002), Kakabadse and Kakabadse (2000a), Quinn, 2000, Bailey et al. (2002), Roberts, V. (2001), (Kremic et al., 2006), Lacity et al. (2008), Assaf et al. (2011), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Increased speed	Kakabadse and Kakabadse(2000a), Lacity et al. (2008), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Greater flexibility	Jennings (2002), Kakabadse and Kakabadse (2000a, b), Jennings (2002), Roberts, V. (2001), Djavanshir, (2005), Garg and Deshmukh (2006) , Kremic et al. (2006), Yang et al. (2007), Lacity et al. (2008), Assaf et al. (2011), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Access to latest technology/infrastructure	Kakabadse and Kakabadse (2000a), Roberts, V. (2001), Wright (2001), Assaf et al. (2011), Tajdini and Nazari (2012)
Access to skills and Talent	McDonagh and Hayward (2000) ,Wright (2001), Kremic et al. (2006), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Increase focus on core Functions	Adler (2000), Jennings (2002), Kakabadse and Kakabadse (2000a, b), McIvor and McHugh (2000), Roberts, V. (2001), Wright (2001), Garg and Deshmukh (2006), Assaf et al.

Expected benefits	Referent researches
	(2011),Yang et al. (2007), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Get rid of problem Functions	McIvor (2000a), (Kremic et al., 2006; McDonagh and Hayward, 2000). Tajdini and Nazari (2012)
Increased safety	Assaf et al. (2011), Marttonen and Kärri(2012)

4.2: Potential risks of outsourcing

Outsourcing, despite the benefits it offers, can be a risky decision. Because outsourcing is a rather recent tool of managers, the complete costs are not yet known, high possession risk in itself. The lack of methodology is believed to cause some outsourcing failures (Bounfour, 1999; Lonsdale, 1999). This thinking is supported by Lonsdale who suggests that outsourcing failures are not due to an inherent problem with outsourcing but rather the lack of guiding methodology for managers (Lonsdale, 1999).

Baitheiemy (2003) states that, while outsourcing is a powerful tool to cut costs, improve performance, and refocus on the core business, outsourcing initiatives often fall short of management's expectations. Through a survey of nearly a hundred outsourcing efforts in Europe and the United States, Baitheiemy (2003) found that one or more of seven "deadly sins" underlie most failed outsourcing efforts: (1) outsourcing activities that should not be outsourced; (2) selecting the wrong vendor: (3) writing a poor contract; (4) overlooking personnel issues; (5) losing control over (he outsourced activity; (6) overlooking the hidden costs of outsourcing: and (7) failing to plan an exit strategy (i.e., vendor switch or reintegration of an outsourced activity. Outsourcing failures are rarely reported because firms are reluctant to publicize them.
While it is recognized that all the potential risks of outsourcing are not currently known, the most relevant outsourcing risks that are also applicable to maintenance outsourcing have been collected from the literature, and are presented in Table 2 From 2000 to now.
T
he outsourcing literature referenced in the table warns of the following potential risks: unrealized savings with a potential for increased costs, employee moral problems, over dependence on a supplier, lost corporate knowledge and future opportunities, and dissatisfied customers. It is also noted that outsourcing may fail because of inadequate requirements definition, a poor contract, lack of guidance in planning or managing an outsourcing initiative, or because of poor supplier relations. For different applications of outsourcing risk assessment, the risks of Table 2 can be specified as risks that will diminish after the outsourcing process and as long-term risks that are related to a relationship between the customer and the service provider. The inability of the service provider and the decreased work morale can be seen to diminish after the outsourcing has been implemented, while the other risks of Table 2 can be seen as long-term risks. In addition, the risks especially related to backsourcing or the ending of the service relationship, include lost know-how, dependence on the service provider, and risks related to contracts or partner selection. Marttonen and Kärri(2012).

Table 2: Potential risks of outsourcing

Potential risk	References

Unrealized savings or hidden costs	Kakabadse and Kakabadse (2000a, b), Bailey et al. (2002), Baitheiemy (2003), Robaina (2006), Kremic et al. (2006), Yang et al. (2007), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Decreased flexibility	Roberts, V. (2001), Bailey et al. (2002), Robaina (2006), \ Yang et al. (2007), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Poor contract or poor selection of partner	Klopack (2000), Krizner (2000), Bailey et al. (2002), Baitheiemy (2003), Robaina (2006), Kremic et al. (2006), Yang et al. (2007), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Lost know-how or Loss of knowledge/skills	Kakabadse and Kakabadse (2000a, b), McIvor (2000a), Roberts, V. (2001),Tajdini and Nazari (2012)
Loss of control/core competence	(Klopack (2000),Roberts, V.(2001), Bailey et al. (2002), Baitheiemy(2003), Robaina (2006), Kremic et al. (2006), Yang et al. (2007), Tajdini and Nazari (2012)
Supplier problems (poor performance or bad relations, opportunistic behavior, not giving access to best talent or technology)	Kakabadse and Kakabadse (2000a), Avery (2000), Fuller et al. (2000) , Roberts, V. (2001), Baitheiemy (2003), Kremic et al. (2006), Yang et al. (2007),Tajdini and Nazari (2012),Marttonen and Kärri(2012)
Losing customers,opportunities, or reputation	Kakabadse and Kakabadse (2000a), Roberts, V.(2001), Marttonen and Kärri(2012)
Dependence on the service provider	Bailey et al. (2002), Robaina (2006), Kremic et al. (2006), Yang et al. (2007), Marttonen and Kärri(2012)
Threatened data security	Bailey et al. (2002), Tajdini and Nazari (2012), Marttonen and Kärri(2012)
Poor morale/employee issues	Kakabadse and Kakabadse(2000a), Story (2000) ,Baitheiemy (2003), Kremic et al. (2006), Yang et al. (2007) , Tajdini and Nazari (2012),

The main consequences of the risks of maintenance outsourcing are presented by Marttonen and Kärri (2012) in Table 3.

Table 3: The main consequences of the risks of maintenance outsourcing

RISKSOF MAINTENANCE OUTSOURCING		CONSEQUENCES OF THE RISKS
Inability of the service provider	→	Increased maintenance costs
Decreased work morale	→	Negligence in operating assets, protests induced by employee firings, worsened company image in the labor market

Lost know-how	→	Increased maintenance costs if the service relationship comes to an end
Dependence on the service provider	→	Worsened terms of contract, Increased maintenance costs if the service relationship comes to an end
Additional or hidden costs, unrealized benefits	→	During the service relationship worsened terms of contract or decreased quality of maintenance work
Threatened data security	→	Information leak-outs to the competitors
Decreased flexibility	→	Commitment to the maintenance contracts despite production and economic conditions
Lost company image and customers	→	Worsened company image through outsourcing announcement and employee firings, negative publicity through service provider actions
Risks related to contracts or partner selection	→	Inadequate terms of contract, service provider opportunism or bankruptcy

5.Assessment of factors affecting outsourcing decisions for maintenance activities

This section presents an assessment of the perceived level of importance for each of the identified 8 Potential risks and 15 Expected outsourcing benefits influencing the decision of outsourcing maintenance services in Aj.O.G.P.C.
Characteristics of the respondents:

The scope of this research was focused on obtaining responses on the developed questionnaire survey from each of of the department managers of 5 departments of Aj.O.G.P.C. The 5 departments are Operations management department, technical management's department, financial management's department, Human Resources management department and Services management department were considered as subject matter experts in the domains of outsourcing practices.

5.1: Development and distribution of the questionnaire survey

A questionnaire survey to assess each of of the identified 8 Potential risks and 15 Expected outsourcing benefits was developed. These benefits were classified under five groups, including strategic, management, technological, economical and quality factors. The evaluation terms used, along with their corresponding scale weight, were "absolutely

important" with 5 points, "very strongly important" with 5 points, "strongly important" with 3 points, "weakly important" with 2 points and "less important" with 1 point. The respondents to the questionnaire survey were asked to mark in their perceived level of importance for each of the identified factors, through selecting one of the five evaluation terms provided.

5.2: Pilot-testing of the questionnaire survey

The developed questionnaire survey was pilot-tested through conducting interviews with the maintenance department managers Aj.O.G.P.C. The pilot-testing of the questionnaire survey served the purposes of testing the clarity and readability of the identified factor statements, pointing out locations of ambiguities, incorporating additional possible factors, and estimating the time needed for filling out the survey. No additional factors were added as the interviewees felt that the presently identified set of factors were sufficient. Reliability Test Results as illustrated in Table 4 and Table 5.

Table 4: Reliability Statistics for benefits

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.939	.938	15

Table 5: Reliability Statistics for risks

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.908	.908	8

5.3: Methodology

Once the collected assessments were tabulated, the mean response for each factor was calculated in the following steps:

(1) The number of responses for each evaluation term will be multiplied by the corresponding weight of that evaluation term.
(2) The sum of the products of multiplication from step (1) will be divided by the number of persons responding to the questionnaire survey.
The perceived rates of importance for each of the identified 8 Potential risks and 15 Expected outsourcing benefits are included in Table 6 and Table 8. A summary of the mean values for each of the identified groups of factors are documented in Table 10.The Friedman chi-square tests the null hypothesis that the ranks of the variables do not differ from their expected value. For a constant of sample size, the higher the value of this chi-square statistic, the larger the difference between each variable's rank sum and its expected value.

Table 6 : Ranks for risks

Potential risks	Mean	Mean Rank
Dependence on the service provider	3.92	5.38
Difficult to monitor the activities of contractors	3.51	4.24
Poor morale/employee issues	3.41	3.99
Increase staff resistance	3.46	4.23
Reduced employee loyalty	3.66	4.78
Unrealized savings or hidden costs	3.64	4.73
Lost know-how or Loss of knowledge/skills	3.73	4.98
Threatened data security	3.32	3.68

Table 7:Test Statisticsa risks

N	182
Chi-square	102.795
df	7
Asymp. Sig.	.000

a. Friedman Test

Table 8:Ranks for benefits

Expected outsourcing b	Mean	Mean Rank
Focus on core activitie		9.08
Access to world class		8.57
Risk sharing with cont		8.27
Freeing resources for		10.43
Increas speed implem		8.10
Save the management		8.01
Reduce the management load	3.04	6.96
Transfer fixed costs to variable	3.52	8.86
Capital infusion	3.20	7.93
Increase economic efficiency	3.07	7.43
Procure higher reliability	2.62	5.14
Improve service quality	2.93	6.41
Initiate innovative ideas and techniques	3.30	8.40
Access to skills and Talent	3.24	8.03
Greater flexibility	3.37	8.37

Table 9:Test Statisticsa benefits

N	182
Chi-square	247.518
df	14
Asymp. Sig.	.000

a. Friedman Test

Table 10: Ranks for summary of the mean values of benefits

Factor	N	Mean	Mean Rank	Std. Deviation
Strategic factors	182	3.4712	3.65	.96209
Management factors	182	3.1447	2.87	1.06876
Economical factors	182	3.2637	3.26	.91642
Quality factors	182	2.7747	2.05	1.03065
Technological factors	182	3.2875	3.16	.90885

Table 11:Test Statisticsa

N	182
Chi-square	113.988
df	4
Asymp. Sig.	.000

a. Friedman Test

Figure 2: Potential risks of maintenance outsourcing

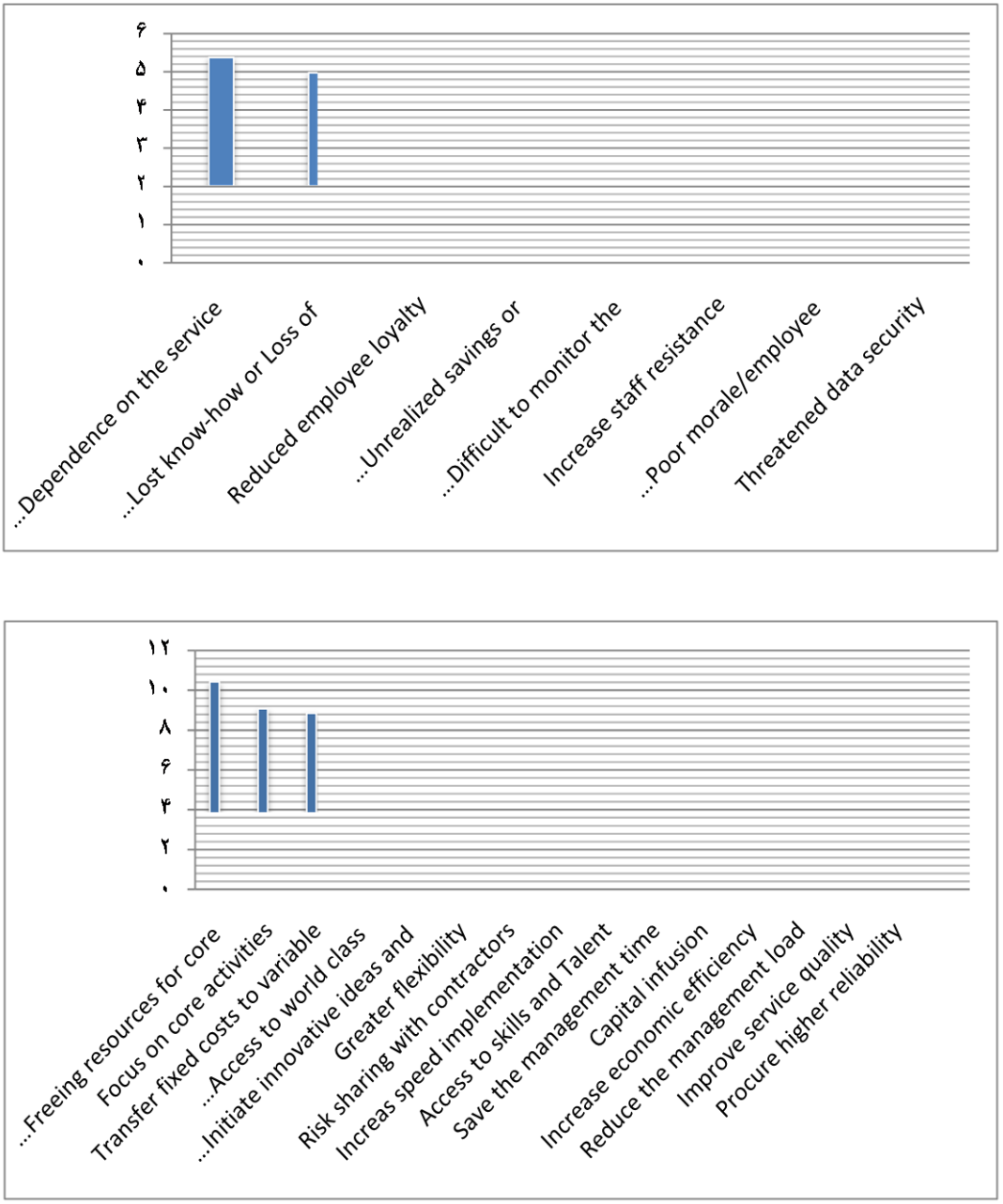

Figure 3: Expected benefits maintenance outsourcing

5.4: Hypothesis

This hypothesis is to test whether outsourcing benefits for the Aj.O.G.P.C. are more than Potential risks Expected.
Hypothesis H0: Benefits = Risks (Potential risks Expected for the Aj.O.G.P.C. are more likely to Benefits.)
Hypothesis H1: Benefits > Risks (Potential risks Expected for the Aj.O.G.P.C. are less likely to Benefits.)
The test is based on significance value (α) of 0.05.

Table 12:Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	H Benefits	3.1884	182	.83416	.06183
	H Risks	3.5804	182	.84605	.06271

Table 13:Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	H Benefits & H Risks	182	-.640	.000

Table 14:Paired Samples Test for Benefits & Risks

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
μ Benefits - μRisks	-.39199	1.52173	.11280	-.61456	-.16942	-3.475	181	.001

The statistical analysis in Table 14 shows the observed significance level is 0.001 (based on one-tailed test) and less than α (0.05). Since the test result is highly significant, H1 is rejected and there is no reason not to accept H0. Therefore the hypothesis test states that a Potential risks Expected for the Aj.O.G.P.C. are more likely to Benefits.

The author agrees with this conclusion because it seems Outsourcing of service activities that took place in a small part is due to an imbalance between the "powers delegated to the contractor" and "responsibilities entrusted to them," the outsourcing activities is not fact lead to reduced volume of enterprise activities. The contractor with a poor response to the responsibilities entrusted to act in the interests of the contracts has created a unilateral.

6. Discussion of the results

The most important Potential risks were identified as" Dependence on the service provider" .The mean value for the Potential risks is illustrated in Table 6. Table 6 and Figure 2 also illustrate the ranking of the Potential risks according to their perceived level of importance by the managers. The strategic factors group included four factors. The factor "Freeing resources for core activities" received the highest mean ratings among all factors in this group. The lowest mean value in this strategic group was attributed to the factor "Risk sharing with contractors". The average mean value for the strategic factors group is illustrated in Table 10.

The management factors group included three factors. The factor "increase the speed of implementation" received the highest mean ratings among all factors in this group. The authors concur with the significance of this factor as contractors do not usually require

extended periods of time to respond to an emerging situation. They are simply hired because they lready posses the needed knowledge and expertise to tackle any emerging situation.

The lowest mean value in this group was obtained for the factor “Reduce the management load”. The average mean value for the management factors group is included in Table 10.

The economical factors group included three factors. The factor “Transfer fixed costs to variable” and “received the highest mean ratings among all factors in this group. The authors see these results to be highly reasonable. The practice of outsourcing has the strong potential to make capital funds readily available for the primary areas of concern to the organization. It reduces the need to invest capital funds for performing secondary functions. manner. The lowest mean value in this economical group was obtained for the factor “Increase economic efficiency”. The average mean value for the economical factors group is indicated in Table 10.

The quality factors group included two factors. The factor “Improve service quality” received the highest mean ratings, among all factors in this group. The authors agree with these survey findings since contractors have more specialized geared staff for performing the maintenance services. This allows the contractor to provide better quality and services at a lower rate. The average mean value for the quality factors group is illustrated in Table 10.

The technical factors group included three factors. The factor “Greater flexibility” received the highest mean rating among all factors in this group. The authors believe that the practice of outsourcing provide organizations the opportunity of not being limited to its own capabilities. Organizations can gain the advantages of new ideas, technologies and improvement potentials from the contractors. The factor “Access to skills and Talent” received the lowest mean value in this group. The average mean value for the technological factors group is illustrated in Table 10. Table 10 and Figure 3 also illustrate the ranking of the factor groups according to their perceived level of importance by the managers.

The findings show that Aj.O.G.P.C generally values the importance of the strategic factors when making outsourcing decisions. The most important Expected outsourcing benefits were identified as” Freeing resources for core activities” and the most important Potential risk were identified as” Dependence on the service provider”. The statistical analysis (T test) in Table 14 shows that the Potential risks is greater than the Expected outsourcing benefits.

7. Conclusions

Organizations are doing more maintenance outsourcing than ever before and managers are in desperate need of information in an organized form that will help them identify opportunities, challenges, and decision factors related to maintenance outsourcing. There is an abundance of information related to maintenance outsourcing in the literature that is waiting to be put into a more structured form for better decision support. With this study we attempt to accomplish this task.

Outsourcing applies to the management of secondary or supplementary service activities of the organization. It has been widely viewed to be an effective opportunity for organizations to reduce expenditures, free-up capital resources, improve service quality and focus on their primary activities.

The main objectives of this research were to identify the Potential risks and Expected outsourcing benefits that affect the decision to outsource maintenance activities in Aj.O.G.P.C.; and rank them according to their perceived level of importance by managers. The survey findings show that Aj.O.G.P.C generally acknowledges the importance of the strategic and Economical factors when making outsourcing decisions. The most important three factors influencing the decision to outsource the maintenance activities in Aj.O.G.P.C. were identified as: “Freeing resources for core activities”, “Focus on core activities” and “Transfer fixed costs to variable” and the most important Potential risk were identified as” Dependence on the service provider”.

The statistical analysis (T test) in Table 14 shows that the Potential risks are greater than the Expected outsourcing benefits. Thus according to manager’s comments, outsourcing is not very profitable for Aj.O.G.P.C.

The study is original in the sense that it identifies how managers rate the importance of the factors influencing outsourcing decisions. This paper provides practical value for managers in Aj.O.G.P.C. confronted with the decision of whether to outsource maintenance activities in their organization. It provides a useful focus for others wishing to outsource some or all of their maintenance services to specialty contractors, irrespective of location.

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