

The Relationship between the Type of Public Organizations and Maintenance Contract(s): A Comparison between the Cities of Riyadh and Salem

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Abstract. This paper investigates the relationship between the type of public organization sectors and the maintenance delivery approach used by these organizations in the cities of Riyadh, Saudi Arabia and Salem, Oregon, USA. In addition, it compares the maintenance delivery approach used by these organizations in relation to the categories of public sectors they are in. The results revealed that there is a significant difference between the maintenance delivery approach used by the public organizations in the two cities. The majority of public organizations in the city of Riyadh (64.1%) outsource their maintenance work to contractors, while only 12.2% in the city of Salem outsourced their maintenance work. In addition, the majority of public organizations in the city of Salem (63.6%) prefer the mixed approach of maintenance versus 28.2% in the city of Riyadh. Furthermore, the results indicate that there is a significant relationship between the public sectors and the type of maintenance approach used by these organizations in the city of Salem. Public organizations in the same sector tend to use the same maintenance delivery approach. On the other hand, this relationship was not significant in the city of Riyadh.

Introduction

Organizations in the public and private sectors may adopt one of three delivery methods to execute maintenance work in their organization facilities. These methods are: (a) using in-house resources; (b) outsourcing to contractors; and (c) a combination of the two methods. The benefit of using in-house resources is being able to quickly respond to unexpected breakdowns, urgent repairs, and security sensitive work environments. This approach is suitable for organizations with inadequate or undefined scope of work but have the expertise to execute maintenance work. On the other hand, outsourcing maintenance and repair work to contractors can result in passing the risk to the contractor or contractors if more than one is used. This approach is suitable for organizations with defined scope of work and have specialized or risky work but don't have the expertise available to execute it. The combination maintenance approach may be used when both circumstances are present in which the organization has both defined and undefined

scope of work, and have some expertise in some fields to execute maintenance work.

Since this paper deals with public organizations, the different types of public organizations were classified by using the questionnaire that was sent to the public organizations in Riyadh, Saudi Arabia in which they classified themselves accordingly. In general, public organizations may fall into the following categories: (1) Health, (2) Education, (3) Public Services, (4) Economical, (5) Industrial, (6) Agricultural, and (7) Military categories.

This research will investigate the nature of the relationship between the type of the public organization (i.e., educational, health, economical, agricultural, ... etc.) and the maintenance delivery approach used, either in-house, outsourcing, or a mixed maintenance approach. In addition, it will compare the cities of Riyadh, Saudi Arabia and Salem, Oregon, USA in terms of maintenance delivery approach and the type of the public organization in order to shed the light on the reasons behind choosing one maintenance approach over the

other in the public sector. This may help public organizations to benefit from the experience of other public organizations in the same of different sectors in terms of choosing the suitable maintenance approach for them.

Research Objectives

The main objective of this research is to investigate the relationship between the maintenance delivery approach and the categories of public organization sectors. The researcher set several objectives that will achieve the main objective of the research, which are:

1. Classify organizations in the cities of Riyadh and Salem according to the different public categories that were determined earlier.
2. Determine the type of maintenance delivery approach that is used by these public organizations.
3. Investigate and determine the nature of the relationship between maintenance delivery approach used by the different public organizations and the different public organizations categories in the city of Riyadh, Saudi Arabia and in the city of Salem, Oregon, USA.
4. Compare the cities of Riyadh and Salem in terms of the maintenance delivery approach used by the different public organizations in relation to the different public categories.

Research Questions and Hypothesis

Some organizations in the public sector use certain approach to execute their maintenance work. Other organizations in the same sector may use the same or different maintenance approach. The different maintenance approaches used by public organizations derived the research questions as follows:

1. Is there a relationship between the maintenance delivery approach used and the public organization sector in the city of Riyadh?
2. Is there a relationship between the maintenance delivery approach used and the type of public organization sectors in the city of Salem?
3. Is there a relationship between the cities of Riyadh and Salem in terms of the maintenance delivery approach used and the different types of public organization sectors?

4. What are the reasons behind preferring one maintenance approach over another?

The research hypothesis were driven from the research questions as follows:

1. There is a relationship between the maintenance delivery approach used and the public organization sector in the city of Riyadh.
2. There is a relationship between the maintenance delivery approach used and the public organization sector in the city of Salem.
3. There is a relationship between the cities of Riyadh and Salem in terms of the maintenance approach used and the different types of public organization sectors.

Literature Review

After reviewing the literature related to the topic of the research, we found that they fall into the following two sections.

Literature related to maintenance delivery approach

In the past decade, many public and owner organizations have resorted to outsourcing, coupled with downsizing of in-house construction departments, as a cost-saving strategy. This approach has been successful for small and medium-sized organizations that can manage all maintenance and repair operations through outsourcing. Recently, however, large organizations that have diverse maintenance and repair programs have resorted to in-house delivery in addition to outsourcing. A positive experience by one owner organization, the Toronto District School Board (TDSB), has reported a successful strategy of delivering part of its infrastructure maintenance and repair programs utilizing in-house crews (Attalla and Hegazy, 2001).

Facilities managers are increasingly relying on contract laborers, individual vendors, and maintenance contracting firms for operations and maintenance tasks. Outsourcing can save money and time, but outsourcing all services or functions could cost more. To save money, and to determine suitability, researching and screening potential contractors is helpful. To protect the company, the legal department should verify that the contractor has adequate insurance and should require the contractor to get a bid bond. Other recommendations are: (1) Read multiple proposals closely and understand what services are needed. (2) Put expectations in writing in the contract; things such as employee demeanor and

frequency of site visits can be included. Since contract employees do not work directly for the company, their loyalty, if wanted, must be worked for. Ways to improve contract employee loyalty include awards, rewards, and treatment like in-house employees (Dubbs, 1992).

Al-Hammad and Assaf (1996) talked about maintenance contracts in terms of outsourcing maintenance work to contractors and they identified different criteria in order to evaluate the maintenance contractors in Saudi Arabia due to the different approaches used by building owners.

Arditi (1999) conducted a survey of the largest 230 property management firms in the United States in order to investigate their current maintenance practices, and to shed light on property management firms' policies concerning outsourcing versus in-house maintenance services, and other concerns. Arditi concluded that service maintenance, corrective maintenance, and deferred maintenance are mostly delivered by selective outsourcing. Routine maintenance and preventive maintenance are mostly delivered by in-house personnel. Only extraordinary maintenance is mostly delivered by outside contractors. The staff used in cleaning the interior and the exterior are mostly obtained by full outsourcing. Inspection and repair and replacement of building systems/equipment are mostly delivered by selective outsourcing. The findings indicate that outsourcing and using in-house personnel are two methods of providing maintenance services each of which appears to have distinct advantages and disadvantages given the circumstances. Both methods are used and justified given the nature of the work and type of maintenance. Finally, the decision to use outside contractors or in-house personnel should not be made indiscriminately but should be based on the type of maintenance and the nature of the maintenance work involved (Arditi, 1999).

An article written in the Alberta Report (1994) indicates that the experience with contracting out has been well documented in public schools where private contractors provide roughly 30% of the bus service, 10% of custodial and maintenance services, 10% of payroll preparation, 25% of cafeteria management and 33% of equipment repair and printing. Many states saved lots of money by outsourcing most of their maintenance and services to contractors, e.g., the Pinckney, Michigan Board of Education outsourced maintenance and pupil transportation at a cost savings of \$500,000 annually, plus a one-time cash infusion of another \$500,000 from the sale of the district's bus fleet. The Union Public Schools in Tulsa, Oklahoma trimmed \$75,000

from their upkeep costs by outsourcing the maintenance work. The biggest savings may be in turning over cafeterias to private companies who typically provide a wider range of meals for 15% to 33% less cost to the taxpayer.

Another article in American School and University (2004) indicates that school Chancellor Joel Klein produced analysis which showed that private contractors could provide maintenance services at a cost of 46% less than in-house staff members. Private contractors already are responsible for about one-third of the maintenance services in New York City schools. The analysis indicated that the additional privatization would save the school system \$20 million.

Some of the largest U.S. airlines are poised to contract out more aircraft maintenance work than ever, which could make the safety of thousands of passenger planes harder for federal inspectors to ensure. The Federal Aviation Administration and airline officials say there's no evidence outsourcing is less safe than doing work in-house; faulty work by both airlines and contract firms known as repair stations has been blamed in past accidents. But signs of increased outsourcing, along with a recent US Airways Express crash that investigators believe stems from a repair by contract mechanics have revived longstanding concerns about the FAA's oversight of maintenance contractors. By 2008, Back Aviation Solutions, a consulting firm that tracks the aircraft maintenance industry, predicts, all U.S. passenger and cargo carriers as a group will outsource 60% of maintenance, a reversal from a decade ago, when about 60% of all work was done in-house (Adams, 2003). This article indicates that the trend in the aircraft industry is leaning towards outsourcing maintenance and repair works.

Another article that was published in the Engineering and Mining Journal, in September 2007, indicates that it is difficult to assign plant employees—either production personnel or maintenance staff for regular service activities, like conveyor inspections and routine adjustments. One solution is the use of contract personnel for this routine maintenance. Here are some considerations for selecting and working with these outside resources. (1) Safety, it may be more important that the contract personnel are to be safety trained, as they will not have the experience and the reinforcement of everyday exposure to the capabilities and limitations of your equipment. (2) Bring Some Expertise, it is important that the expertise be found in the individual(s) who will actually perform the work, and not just in the person who sold you the service.

(3) Commitment to Your Operation, these outside resources are by definition not employees of your operation. But they will need to take ownership for the conveyor system and for the plant's efficient and productive use of that system. They must demonstrate a dedication to your operation, and to their responsibilities and duties. (4) The Cost vs. The Value, usually, you get what you pay for. Unskilled or inexperienced contract laborers may not provide any benefit; they won't know what to look for or what they are seeing. More experience will cost more, but provide a real benefit.

A report published by the United States accountability office in 2006 showed that Transportation Security Administration (TSA) obligated almost \$470 million from fiscal year 2002 through fiscal year 2005 for the maintenance of the Explosive Detection Systems (EDS) machines and Explosive Trace Detection (ETD) machines. In fiscal year 2006, TSA estimates it will spend \$199 million and projected it will spend \$234 million in fiscal year 2007. TSA has used contractors to perform preventative and corrective maintenance on these EDS and ETD machines. The cost of maintaining checked baggage-screening equipment has increased as more EDS and ETD machines have been deployed and warranties expire. TSA's move in March 2005 to firm-fixed-price maintenance contracts for EDS and ETD maintenance was advantageous to the government in that it helps control present and future maintenance costs. Firm-fixed-price contracts also help ensure price certainty and therefore are more predictable. This report shows that the department of home security outsourced the maintenance of these sensitive machines in order to minimize their cost of maintenance.

As with any outsourcing deal, the key to a successful maintenance contract is knowing which applications to relinquish and which to keep in house. Many companies and public organizations choose to hand off less critical systems and retain responsibility for applications more central to their business. For example, a retail bank might outsource its legacy HR applications so it can focus on systems for demand deposit accounting or funds transfer. Not surprisingly, companies have had an easier and more successful time outsourcing routine business operations rather than strategic ones, according to recent research by MIT Sloan School of Management's IT Group (Asbrand, 1997).

In the medical field, hospitals that are still using outsourcing, they like this service. It can be much more cost effective to buy outside expertise than to develop it in-house, especially if you need

something immediately. But while outsourcing is growing overall, the kinds of services involved may be shifting. In many cases, outside pharmacy directors and upper managers would be brought in to turn around problems in pharmacy operations and quality. Retaining an outside problem solver as a permanent pharmacy manager could be good for the hospital, but it left the outsourcing firm shorthanded (Gebhart, 2008).

In conclusion, the literature related to maintenance contracts indicates that the main approaches of maintenance and repair works which are in-house and outsourcing are two methods to provide maintenance services and each has its own advantages and disadvantages, and that the decision to use any of them or a combination of both should not be made indiscriminately but should be based on the type of maintenance and the nature of the maintenance work involved.

Literature related to public organization sectors and maintenance issues

Cormwell (1991) explored maintenance practices in the local public sector and their relationship to state and federal grant policies. If state and federal grant policies induce local governments to substitute new investment for the maintenance of existing capital, excessive deterioration of public infrastructure may result. Using a new data set on the maintenance policies of local mass-transit providers, it shows that private owners of transit capital equipment devote significantly greater resources to maintenance than do public owners of similar capital. (Cormwell, 1991).

Much of the basic work of the U.S. federal government is performed by private contractors. This reliance on contractors is not new. It is the product of bipartisan reform that dates to the mid-20th century. The reform has yielded major successes, but has left a legacy of unaddressed questions, including the ability of the official workforce to account for the government's work. This article by Guttman (2003) recounts the history of the ongoing reform from two viewpoints. First, it reviews organizational models that serve as building blocks for the relationships between organizations and contractors. Second, it focuses on the constitutional models within which the organizational models operate. The underlying argument is that the early reformers identified questions of constitutional significance that have yet to be resolved, and at least three models for their possible resolution concurrently exist (Guttman, 2003).

The field of service outsourcing is less developed at the state and local levels. John

O’Looney published a book that provides the best available advise about deciding to outsource a service and how to proceed with the outsourcing process in a step-by-step fashion. The book is directed towards local and state government general managers, as well as agency and unit executives, and public employees who specialize in contract management. The literature review on service outsourcing, privatization, and contract management was heavily weighted toward proving—either theoretically, economically, or practically—that outsourcing or privatization would be either a great boon or a cleverly disguised trick to eliminate government entirely. Essentially, this literature tended to be dominated by both high- and low-quality econometric studies purporting show some level of cost savings due to outsourcing or privatization (O’Looney, 2000).

The existing literature reveals that there is no exclusive study that has been done to investigate the relationship between the maintenance delivery approaches and the type of the public sector either health, educational, economical, industrial, agricultural, and military. This research will study these two main variables in depth in addition to other variables in order to find out the nature of that relationship. In addition, it will compare two major cities, Riyadh, Saudi Arabia, and Salem, Oregon, USA in terms of the public organizations and the maintenance delivery approaches used.

Methodology

Data from randomly selected public organizations in the city of Riyadh, Saudi Arabia were collected by conducting a survey that was sent to the maintenance departments in the randomly selected public organizations. Public organizations in Riyadh were found to be 137 as listed in the high committee of Administrative Rectification at the Institute of Public Administration. The sample size was determined by using the formula of simple random sampling which is:

$$n = \frac{z^2 P(1-P)}{E^2}$$

where n is the sample size; Z is the value of Z at 95% confidence interval which is (1.96); P = 50% it is assumed based on the ambiguity of the population, but 50% will give the maximum sample size; and E is the error and it is equal to (0.05). By substituting the values in the formula, we arrived at the sample size as follows:

$$n = \frac{(1.96)^2 * (0.5)(1-0.5)}{(0.05)^2} = 384$$

500 questionnaires were sent and 396 questionnaires were received back. This gave us a response rate of 79.2% which indicates a good response to be used in the analysis.

Data from public organizations in the city of Salem, Oregon, USA were collected by conducting phone calls and interviews of the maintenance departments’ engineers and technicians in the public organizations that are similar to those randomly selected in Riyadh, Saudi Arabia. This was done to compare the same organizations in the two cities and to homogenize data.

Descriptive analysis was performed using frequencies, ratios, means, and median. In the quantitative analysis, statistical tests such as Cramer’s V, and Fisher Exact tests were conducted to determine the nature of the relationship between the delivery approach of maintenance work used by public organizations and the type of public sector. These tests were also used to compare the cities of Riyadh and Salem.

Data Analysis

The Statistical Package for Social Sciences (SPSS) software for Windows release 10.0.7 was used to analyze the data. Data analysis was divided into descriptive and quantitative analysis as follows:

Descriptive analysis

(1) Public organizations in the cities of Riyadh and Salem

The number of public organizations that were randomly used in the city of Riyadh was 39 out of 72 public organizations with a percentage of 54.2%, and the number of the similar public organizations in the city of Salem was 33 out of 72 public organizations with a percentage of 45.8%. Table 1 and Fig. 1 show these percentages. The difference in numbers between the two cities in terms of public organization is due to the different organizational structures used by the two cities and the different responsibilities given to these organizations, e.g., the planning division of the city of Salem is the organization that is responsible for the planning of the city, on the other hand there are two organizations that deal with planning issues in the city of Riyadh, which are the Ministry of Municipal and Rural affairs, and Arriyadh Development Authority. In addition, most of the responsibilities performed by the Ministry of

Information and Culture in Riyadh, Saudi Arabia are performed by a US Federal organization called the Federal Communications Commission which is located in Washington DC, USA and not in the city of Salem, Oregon.

Table 1. Percentage of public organizations in the cities of Riyadh and Salem

City	Frequency	Percent
Riyadh	39.0	54.2
Salem	33.0	45.8
Total Responses	72.0	100

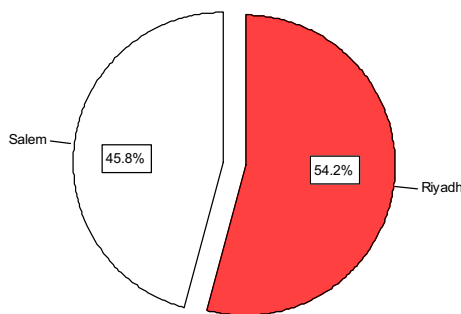


Fig. 1. Percentage of public organizations in the cities of Riyadh and Salem.

(2) Maintenance delivery approaches in the cities of Riyadh and Salem

Outsourcing maintenance work seems to be more popular among the public organizations in the city of Riyadh, 64.1% of the randomly selected public organizations outsourced all of their maintenance work. This could be contributed to the relatively cheap labor cost in the city of Riyadh. A percentage of 28.1% of the public organizations in the city of Riyadh adopted the mixed approach of maintenance (in-house and outsourcing simultaneously). Only 7.7% of these public organizations adopted the in-house approach. On the other hand, the mixed approach of maintenance (in-house and outsourcing) seems to be more popular among the public organizations in the city of Salem, 63.6% of public organizations that are similar to those randomly selected in Riyadh city adopted the mixed approach, where 24.2% performed their maintenance work in-house, and only 12.2% outsourced all of their maintenance work to one or more than one contractor. Table 2 and Figs. 2 and 3 show the different approaches of maintenance work delivery and the percentages of the public organizations using each approach.

Table 2. Maintenance delivery approach in the cities of Riyadh and Salem

Maintenance Approach	Riyadh	Salem
	Valid Percent	Valid Percent
In-house	7.7	24.2
Outsourcing	64.1	12.2
Mixed	28.2	63.6
Total Percent	100	100

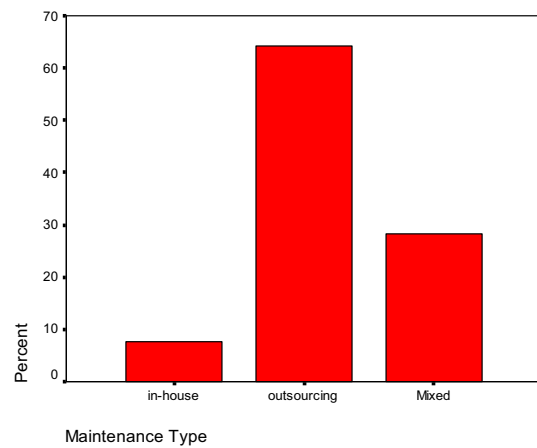


Fig. 2. Maintenance delivery approach in the city of Riyadh.

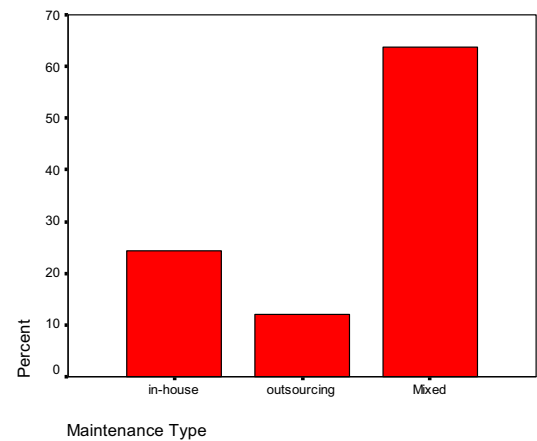


Fig. 3. Maintenance delivery approach in the city of Salem.

(3) Public organization sectors types in the cities of Riyadh and Salem

Public Services sector constituted 35.9% of the public organizations in the city of Riyadh. This is the highest percentage among the different public sectors in this city. Education was the second with a percentage of 23.1%, then Military, Economical, Industrial, Health, and finally Agricultural sectors with the percentages of 15.4%, 10.3%, 7.7%, 5.1% and 2.6%, respectively. In the city of Salem, Public

Services sector had the highest percentage as well (33.3%). Education was the second (21.2%), then Economical, Industrial, Military, Health, and finally Agricultural sectors with the percentages of 18.2%, 9.1%, 9.1%, 6.1% and 3.0%, respectively. Table 3 and Figs. 4 and 5 show the percentages of the different public sectors in the cities of Riyadh and Salem.

Table 3. Public organization Sectors in the cities of Riyadh and Salem

Public Sectors	Riyadh	Salem
	Valid Percent	Valid Percent
Health	5.1	6.1
Education	23.1	21.2
Public Service	35.9	33.3
Economical	10.3	18.2
Industrial	7.7	9.1
Agricultural	2.6	3.0
Military	15.4	9.1
Total Percent	100	100

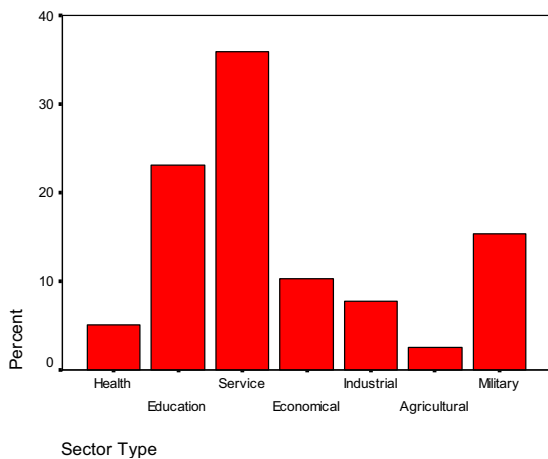


Fig. 4. Public organization sectors in the city of Riyadh.

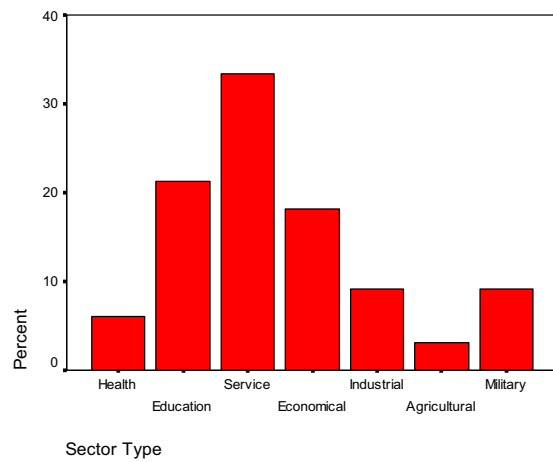


Fig. 5. Public organization sectors in the city of Salem.

Quantitative analysis

(4) The relationship between public organization sectors and maintenance delivery approach in the city of Riyadh

The relationship between the different public sectors and the maintenance delivery approach used by these organizations in the city of Riyadh was tested using Cramer’s V test. The value of Cramer’s V was (0.382) and the P-value was (0.494) as shown in Table 4. This indicates that there is no significant relationship between the public sectors and the maintenance delivery approach used by these organizations in the city of Riyadh at 95% confidence level. The test shows that there is no clear trend in the maintenance delivery approach used by public organizations in the same sector in the city of Riyadh e.g., some organizations used in-house while others in the same sector outsourced their maintenance work, or used a mixed approach.

Table 4. The relationship between the public organization sectors and maintenance delivery approach in the city of Riyadh

Sector Type	Maintenance Type			Cramer’s V Value	P-Value
	% of in-house	% of outsourcing	% of mixed		
Health		100%		0.382	0.494
Education		66.7%	33.3%		
Public Service	14.3%	50.0%	35.7%		
Economical		50.0%	50.0%		
Industrial		100%			
Agricultural			100%		
Military	16.7%	83.3%			

(5) The Relationship Between Public Organization Sectors And Maintenance Delivery Approach In The City Of Salem:

The same test of Cramer's V was performed to test the relationship between the different public organization sectors and the maintenance delivery approach used by these organizations in the city of Salem. The value of Cramer's V was (0.793) and the P-value was (0.00) as shown in Table 5. This indicates that there is a significant relationship between the public organization sectors and the maintenance delivery approach used by these organizations in the city of Salem at 95% confidence level. Public organizations in the same sector tend to use the same approach of maintenance work either in-house, outsourcing or a mixed approach.

The test results showed that health organizations prefer a mixed approach of maintenance delivery in which they would have a small maintenance crew to perform the routine and small maintenance jobs, while they would outsource bigger jobs to contractors. Bigger maintenance jobs are defined by some of these organizations as jobs that would take more than one day to finish. These organizations cannot offer to put all of their maintenance crew in one job while they may be needed in other places in the facility. Service, education, and agricultural organizations also prefer the mixed approach of in-house and outsourcing. Some of the government buildings that are occupied by the public organizations are owned by the State of Oregon, and the Department of Administrative Services (DAS) is the one in charge of the maintenance of these facilities. The Department of Administrative Services (DAS) has different maintenance crews while they outsource big maintenance jobs to contractors, e.g. remodeling,

modifications, new jobs ... etc. Economical organizations prefer to outsource their maintenance work and the reason is that these organizations lease their offices from private organizations or companies who are responsible for the maintenance of their facilities. For security purposes, military organizations prefer in-house maintenance in which they have crews to maintain their facilities.

(6) The Relationship Between The Cities Of Riyadh And Salem In Terms Of Maintenance Delivery Approach:

The relationship between the cities of Riyadh and Salem in terms of maintenance delivery approach was tested using Fisher Exact test. This test examines the difference between the two cities in terms of the maintenance delivery approach used by the public organizations in the two cities. The test reveals that there is a significant difference between the two cities in terms of the maintenance delivery approach used by the public organizations in the cities of Riyadh and Salem. Chi square value is (20.245) and the P-value is (0.00) as shown in Table 6. The majority of the public organizations that used in-house maintenance approach were located in the city of Salem with a percentage of 72.7%, while the percentage of the public organizations in the city of Riyadh that used in-house approach for their facilities maintenance was 27.3% only. On the other hand, the majority of the public organizations that outsourced all of their maintenance work were located in the city of Riyadh with a percentage of 86.2%, while only 13.8% of the public organizations in the city of Salem outsourced all of their maintenance work. The mixed approach was more popular among the public organizations in the city of Salem with a percentage of 65.6%, and only 34.4% in the city of Riyadh.

Table 5. The relationship between the public organization sector and maintenance delivery approach in the city of Salem

Sector Type	Maintenance Type			Cramer's V Value	P-Value
	% of in-house	% of outsourcing	% of mixed		
Health	0%	0%	100%	0.793	0.00
Education	42.9%	0%	57.1%		
Public Service	0%	0%	100%		
Economical	33.3%	16.7%	50.0%		
Industrial	0%	100%	0%		
Agricultural	0%	0%	100%		
Military	100%	0%	0%		

Table 6. Testing the difference between the cities of Riyadh and Salem

City Name	Maintenance Type			Total	Chi Square	P-Value
	In-house	Outsourcing	Mixed			
Riyadh	27.3%	86.2%	34.4%	54.2%	20.245	0.00
Salem	72.7%	13.8%	65.6%	45.8%		
Total	100%	100%	100%	100%		

Conclusions

There is a significant difference between the city of Riyadh and the city of Salem in terms of maintenance delivery approach used by the public organizations in the two cities. Fisher Exact test revealed that the majority of public organizations in the city of Riyadh with a percentage of 64.1% outsource their maintenance work to contractors. On the other hand, the city of Salem shows the opposite trend with only 12.2% of the public organizations outsource their maintenance work to contractors, and the majority of public organizations with a percentage of 63.6% use the mixed approach of maintenance.

Cramer's V tests showed that in the city of Salem, there is a relationship between the public sectors and the type of maintenance approach used by the public organizations. Organizations that fall in the same category tend to use the same type of maintenance delivery approach either in-house, outsourcing, or the mixed approach. In addition, the same test revealed that in the city of Riyadh, there is no significant relationship between the public sectors and the type of maintenance approach used by the public organizations. Organizations that fall in the same category use different maintenance delivery approach. These differences between the two cities might be a result of the differences in the organizational structure between the two cities, and that might also contributed to the difference in the number of organizations in the two cities as well as the classifications of these organizations. Another reason is that most of the public organizations in the city of Riyadh have their own maintenance department which varies in building size and the number of employees working in these departments, and each maintenance department chooses the maintenance delivery approach that suits their needs. On the other hand, some of the government buildings that are occupied by the public organizations in the city of Salem are owned by the State of Oregon, and the Department of Administrative Services (DAS) is the one in charge of the maintenance of these facilities. In addition, the availability and cost of labor might be a factor of outsourcing maintenance work in the city of Riyadh compared to the city of Salem.

Quantitative variables can be investigated and recommended for future research in which micro variables such as labor, material, equipment costs, availability of labor, equipment, contractors costs ... etc.; and macro variables such as the gross domestic product, annual interest rate, government budgeting for public organizations ... etc., can be investigated to derive the variables that may contribute to choosing one type of maintenance over another in the public organizations.

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العلاقة بين نوعية القطاع الحكومي وطرق تنفيذ أعمال الصيانة: دراسة مقارنة بين مدينتي الرياض وسالم

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ملخص البحث. تبحث هذه الورقة في العلاقة بين نوعية القطاع الحكومي وطريقة تنفيذ أعمال الصيانة المستخدمة فيها في كل من مدينة الرياض بالمملكة العربية السعودية ومدينة سالم بولاية أوريغون بالولايات المتحدة الأمريكية الحكومية. إضافة إلى أن هذه الورقة تقارن بين طرق تنفيذ أعمال الصيانة في هاتين المدينتين وعلاقتها بنوعية القطاعات الحكومية. وقد بينت نتائج البحث أن هناك اختلافاً ذا دلالة إحصائية بين طريقة تنفيذ أعمال الصيانة المستخدمة في القطاعات الحكومية في هاتين المدينتين؛ حيث إن غالبية الجهات الحكومية في مدينة الرياض ونسبة ٦٤٪ تقوم بتنفيذ أعمال الصيانة لديها تعاقدياً، بينما ١٢,٢٪ من القطاعات الحكومية في مدينة سالم تنفذ أعمال الصيانة لديها تعاقدياً. كما أن غالبية الجهات الحكومية في مدينة سالم (٦,٦٣٪) يفضلون الطريقة المختلطة لتنفيذ أعمال الصيانة لديهم مقابل ٢٨,٢٪ في مدينة الرياض. كما أشارت النتائج إلى أن هناك علاقة ذات دلالة إحصائية بين نوعية القطاع الحكومي وطريقة تنفيذ أعمال الصيانة في مدينة سالم، حيث إن الجهات الحكومية التي تقع في التصنيف القطاعي نفسه في مدينة سالم تميل إلى استخدام الطريقة نفسها لتنفيذ أعمال الصيانة لديها سواء كانت ذاتية أم تعاقدية أم خليطاً بين النوعين. وفي المقابل لم تكن هذه العلاقة ذات دلالة إحصائية في مدينة الرياض حيث إن بعض الجهات الحكومية والتي تقع في التصنيف القطاعي نفسه تنفذ أعمال الصيانة لديها ذاتياً بينما البعض الآخر في التصنيف نفسه ينفذ أعماله تعاقدياً والبعض الآخر يستخدم خليطاً بين النوعين عند تنفيذ أعمال الصيانة لديهم.