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Comparing The Performance of Traditional Operation and Maintenance Contracting Services with Integrated Facility Management Services of Public Sector Entities in Terms of End-User Satisfaction

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Abstract

This paper covers the collection and analysis of data through a survey conducted at Kuwait Ports Authority's Ports Complex. Since quality is an important indicator for the selection of an optimum facility management operating model, the questionnaire evaluates the level of satisfaction of the end-users with the current services at the Ports Complex. End user satisfaction reports from a local facility management firm are collected to assess the quality of services provided. By evaluating the end-user satisfaction level of both KPA's current traditional practices and local's integrated facility management practices, conclusions will be drawn as to whether end-user satisfaction can be optimized.

Introduction

Kuwait Ports Authority (KPA) is a public-sector entity operating under the Ministry of Communications to run the three commercial ports of Kuwait – Shuwaikh port, Shuaiba port, and Doha port. KPA's vision is to facilitate the economic progress of Kuwait through the development of its ports and to construct an advanced ports system that will cater to the needs of Kuwait and its trading sector. Since the ports facilitate Kuwait's economic progress, the adoption of a system that will enhance KPA's organization is necessary. Enhancing facility management practices in KPA will guarantee its readiness to tackle future ventures and predominantly Kuwait's vision 2035. With the approach of Kuwait's vision 2035, the optimization of FM practices is crucial.

The focus of this study is to optimize the facility management practices in the Ports Complex of KPA. T The Ports Complex has a total built-up area of 73,504 square meters.he Ports Complex is the administrative building of KPA employing 330 members of the workforce. Facility services such as cleaning, safety and security, and building systems, if optimized, would lead to an increase in productivity. Applying integrated facility management services would allow KPA to focus on core business objectives while reducing costs and increasing end-user satisfaction.

In Kuwait, the traditional procurement practice consists of contracting out each service separately to a different supplier. This can cost more, be difficult to manage, and lead to disputes and unsatisfaction of end-users. The advantage of this type of single-service facility management comes when the "best of the breed" supplier is selected in the procurement phase. However, with public-sector entities in Kuwait, the selection is based on the lowest-priced bid. Currently, to manage their facilities, Kuwait Ports Authority undergoes the traditional approach of contracting out services in Kuwait. This approach does not necessarily lead to cost savings, as cost implications can arise in the long run, with disputes between contractors on maintenance scheduling and impairment accountability. Aside from added costs, this type of facility management contracting can

lead to decreased end-user satisfaction. Figure 1 illustrate the difference between both facility management operating models.

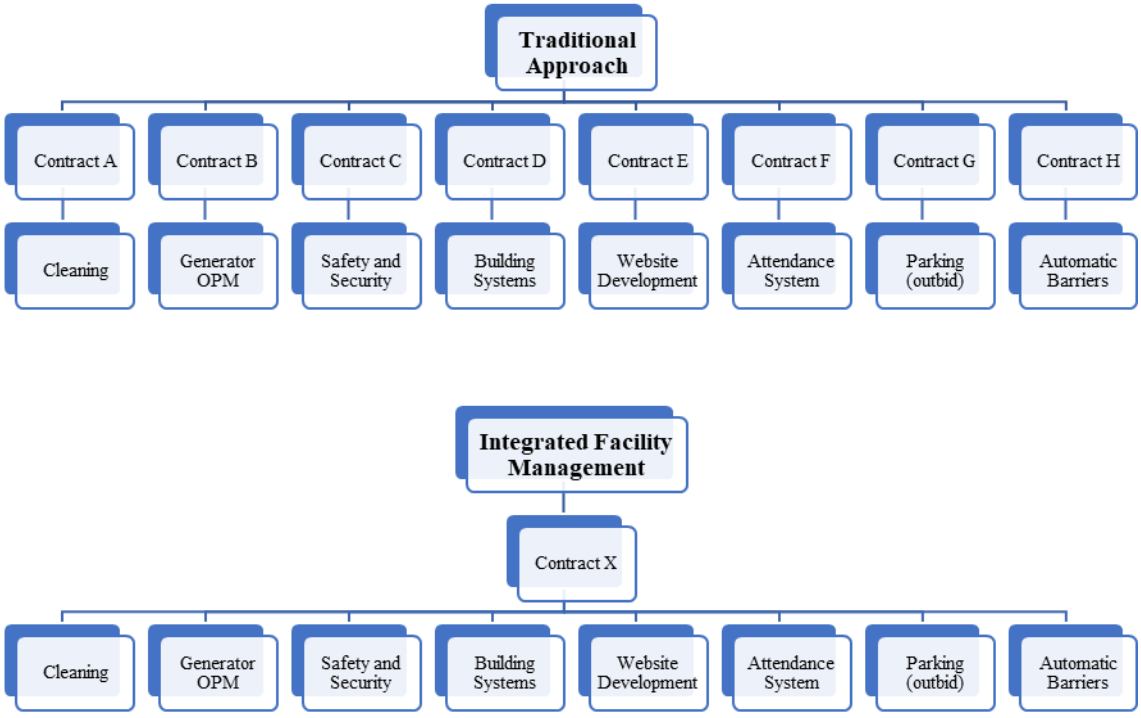

Figure 0 Traditional approach vs Integrated facility management

Research Objectives

The study aims to compare traditional facility management with integrated facility management in terms of cost and end-user satisfaction with the intention of optimizing facility management practices in government sectors. The operating model which verifies cost-saving and increased end-user satisfaction is selected as the optimum facility management model for KPA. In order to achieve the purpose of the study, the objectives s to compare the end-user satisfaction of traditional and integrated facility management. The model with the higher end-user satisfaction level is considered the optimum model.

Facilities Management Definition

In 2003, the International Facility Management Association (IFMA) redefined facility management as "a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology". Before revising the definition, IFMA used the one provided by Facility Management Institute (FMI) in 1983. The former definition was "Facility management is the practice of coordinating the physical workplace with the people and the work of the organization. It integrates the principles of business administration, architecture, and the behavioral and engineering sciences." (McMorrow Report, LLC., 2003)Although definitions of facility management are somewhat diversified, they share a common vision and mission. The ultimate goal is to define the scope of activities and workspace environment, and improve them in order to sustain "continuous longevity and profitable growth". (Mohamat, Mohammed, & Alias, 2014)

Facilities Management Hard vs. Soft Services

Facility management services can be classified into hard and soft. Hard services are ones that concern the physical structure of the building and are required by law as they affect the safety and welfare of the end user. That being said, hard facility management services are non-negotiable and cannot be removed. Examples of hard services include, but are not limited to HVAC, power supply and energy management, water supply, data and voice cabling, and fixtures and fittings. On the other hand, soft services make the workplace more pleasant and help to increase comfort, security, productivity, and efficiency. Cleaning, catering, guarding and security, and reprographics are all considered soft services. According to the Royal Institution of Chartered Surveyors, there are other aspects of facility management that do not fit into the hard/soft classification. These services include, but are not limited to, environmental

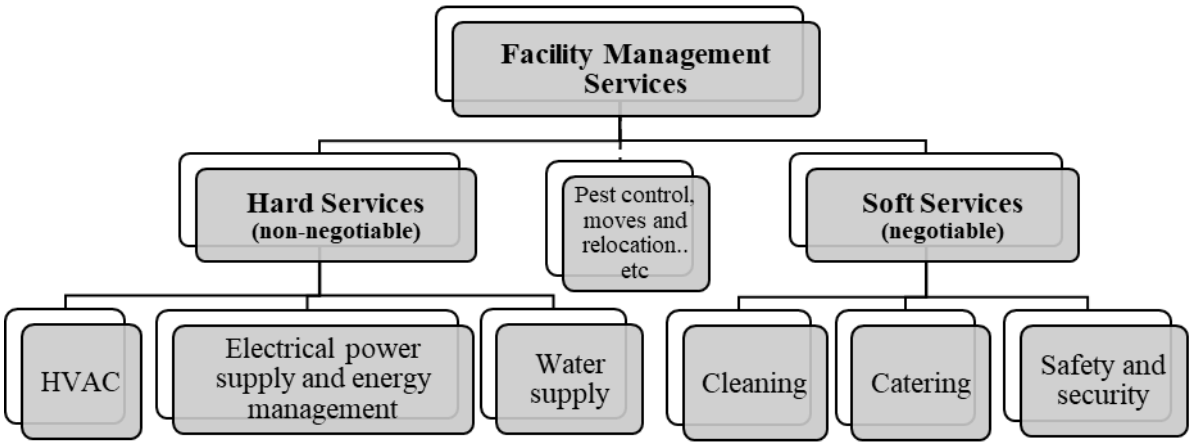

Figure 0. Facility management services classification

management, moves andrelocation, workspace design, pest control, and document archiving. (Wilson, 2018)

Methodology

Statistical Package for Social Sciences (SPSS) is a data analysis software used for analyzing the survey responses. Initially, Cronbach's alpha is determined through the software to verify the reliability of the survey. After that, the frequencies of the demographics are analyzed to get an overall picture of the respondents' characteristics. The relative importance index (RII) of all the Likert questions is calculated in order to rank the services from lowest to highest satisfaction level. The average RII is calculated to assess the overall satisfaction level with the Ports Complex facility services.

Figure 3 Methodology breakdown for end-user satisfaction survey at KPA

To assess the end-user satisfaction level of FACILITY MANAGEMENT FIRM's integrated facility management services, end-user satisfaction reports are acquired from FACILITY MANAGEMENT FIRM. Although the results cannot be statistically compared, conclusions will be made as to whether KPA's current situation can be improved.

Questionnaire

The questionnaire will be printed and distributed in-person to the workforce at KPA's Ports Complex. According to Anderson, the first advantage of face-to-face surveys is that it allows for more accurate responses since respondents are more focused and engaged. The second advantage is that it can facilitate the sampling of hard-to-reach respondents, such as individuals with low technology penetration (Anderson). The response rate of in-person surveys have also proven to provide a significantly higher response rate than online surveys (Nulty, 2008). The survey questions are all close-ended in order to save time, simplify analysis, and enable the collection of a greater number of respondents.

Table 1. 5-point Likert scale applications (McLeod, 2009)

Response Set	**1**	**2**	**3**	**4**	**5**
Frequency	Never	Rarely	Sometimes	Often	Always
Quality	Very Poor	Poor	Fair	Good	Excellent
Agreement	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Satisfaction	Very Unsatisfied	Unsatisfied	Neutral	Satisfied	Very Satisfied

Sample Size

The population size, critical value of the normal distribution, sample distribution, and margin of error may all be used to construct the equation. The sample size formula is (Thakur & Vaidya):

$$n = N \times \frac{\frac{Z_{\alpha/2}^2 \times p \times (1-p)}{e^2}}{N - 1 + \frac{Z_{\alpha/2}^2 \times p \times (1-p)}{e^2}} \quad (1)$$

where,

n = minimum sample size

N = population size,

$Z_{\alpha/2}$ = critical value of the normal distribution at the specified confidence interval (can be looked up from a z-table or table 2),

p = sample proportion (0.5 is the most conservative and gives the largest possible sample size),

e = margin of error (the smaller the margin of error, the higher the precision, it is common to choose 5% margin of error),

Table. 1 $Z_{\alpha/2}$-values for common confidence levels (Glen, Z Alpha/2 (za/2): What it is, How to Find it, n.d.)

Confidence level	**α**	**α/2**	**$Z_{\alpha/2}$**
90%	10%	5%	1.645
95%	5%	2.5%	1.96
98%	2%	1%	2.326
99%	1%	0.5%	2.576

For this study, the population size, N = 330, the sample proportion, p = 50%, and the margin of error, e = 5%. A confidence interval of 90% will be used, thus, $Z_{\alpha/2}$ = 1.645 By substituting into the formula:

$$n = 330 \times \frac{\frac{1.645^2 \times 0.5 \times (1-0.5)}{0.05^2}}{330 - 1 + \frac{1.645^2 \times 0.5 \times (1-0.5)}{0.05^2}} = 148.93 \approx 149$$

Accordingly, a sample size of 149 is required for the survey targeting the Ports Complex employees.

Response rate

The relative importance (RII), ranging from zero to one, of each of the 23 test items is calculated using the following equation :

$$Relative\ Importance\ Index\ (RII) = \frac{\sum w_i n_i}{A \times N} \quad (2)$$

where,

w_i = the weight of the *i*th response

n_i = the frequency of the *i*th response

A = the maximum weight (=5 in the case of this survey)

N = the number of the respondents (=152 respondents in the case of this survey)

The weight of each response ranging from 1 (very unsatisfied) to 5 (very satisfied)

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By substituting into equation 2,

$$Relative\ Importance\ Index\ (RII) = \frac{n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{760} \quad (3)$$

where n_1 = frequency of very unsatisfied, n_2 = frequency of unsatisfied, n_3 = frequency of neutral, n_4 = frequency of satisfied, and n_5 = frequency of very satisfied.

After calculating the RII of each test item, the 23 items will be ranked from lowest to highest level of satisfaction. The average RII of all test items will indicate whether the employees at the Ports Complex are satisfied.

End-User Satisfaction

152 surveyors responded to 23 questions that cover all service contracts of interest in the study, except for generator operation and maintenance. Table 2 allocates the survey questions corresponding to each contract that has been studied in this paper. As aforementioned in previous section, the relative importance index is the selected method for data analysis. In the book, Measuring and Improving Patient Satisfaction, Patrick J. Shelton addressed the significance of using the relative importance index to quantify satisfaction (Shelton, 2000). Similar to this study, Tholibon et al. used the relative importance index to rank factors of employer satisfaction towards industrial training students (Tholibon, et al., 2021). In this section, the 23 test items are ranked from lowest to highest level of satisfaction according to the RII as shown in table 3.

Table 2 Survey questions corresponding to each of the service contracts

	How satisfied are you regarding:	**Contract**
1	**Cleanliness** of the Ports Complex main building	Cleaning
2	**Cleanliness** of the Ports Complex parking lot	Cleaning
3	**Cleanliness** of the toilets	Cleaning
4	Responsiveness of the **cleaning crew**	Cleaning
5	**Level of safety and security** in the Ports Complex and its offices	Safety and security
6	Responsiveness, professionalism, and **quality of assistance of security guards** in Ports Complex	Safety and security
7	**Level of safety** in parking lot	Safety and security
8	**Quality of security guard assistance** in parking lot	Safety and security
9	Ease of **car parking** in parking lot (availability of parking spots and ability to maneuver)	Parking
10	Serviceability of **car parking proximity cards** and **automatic barriers** to enter parking	Automatic barriers
11	Level of comfort of **indoor climate** (Considering air temperature, humidity, and air movement)	Building systems
12	Level of comfort of **lighting**	Building systems
13	Maintenance of **water leakage**	Building systems
14	Serviceability and maintenance of **water fountains**	Building systems
15	Efficiency of **telephone network system**	Building systems
16	Usability and maintenance of **elevators**	Building systems
17	**Maintenance** of **air conditioning, heating and ventilation** system (Considering timeliness and quality of service)	Building systems

18	**Maintenance** of **electric services** in Ports Complex (Considering timeliness of response to a fuse, burnt lightbulb, or other electricity issues)	Building systems
19	Quality and maintenance of wooden, aluminum, and metal **doors**	Building systems
20	**Technical support** for Kuwait Ports Authority **website and network**	Development and Maintenance of Website
21	Efficiency and speed of **employee portal and other used networks**	Development and Maintenance of Website
22	**Attendance** face recognition and fingerprint system serviceability	Fingerprint and Face Recognition Attendance System
23	**Maintenance** of any **malfunctioning services** (Are maintenance requests resolved completely and in a timely manner?)	General

Table 3 Mean and RII of service test items ranked in order from lowest to highest level of satisfaction

Rank	Level of Satisfaction	Mean	RII
1	Serviceability and maintenance of water fountains	1.408	0.282
2	Cleanliness of the toilets	1.954	0.391
3	Cleanliness of the Ports Complex main building	2.013	0.403
4	Efficiency of telephone network system	2.355	0.471
5	Cleanliness of the Ports Complex parking lot	2.388	0.478
6	Technical support for Kuwait Ports Authority website and network	2.401	0.480
7	Usability and maintenance elevators	2.454	0.491
8	Maintenance of HVAC (considering timeliness and quality of service)	2.454	0.491
9	Efficiency and speed of employee portal and other used networks	2.454	0.491
10	Responsiveness of the cleaning crew	2.461	0.492
11	Quality and maintenance of wooden, aluminum, and metal doors	2.467	0.493
12	Maintenance of electric services in Ports Complex (Considering timeliness of response to a fuse, burnt lightbulb, or other electricity issues)	2.480	0.496
13	Level of comfort of indoor climate (considering air temperature, humidity, and air movement)	2.513	0.503
14	Maintenance of water leakage	2.546	0.509

15	Maintenance of any malfunctioning services (are maintenance requests resolved completely and in a timely manner?)	2.586	0.517
16	Responsiveness, professionalism, and quality of assistance of security guards in the Ports Complex	2.618	0.524
17	Level of comfort of lighting	2.638	0.528
18	Quality of security guard assistance in parking lot	2.651	0.530
19	Level of safety in parking lot	2.704	0.541
20	Level of safety and security in the Ports Complex and its offices	2.711	0.542
21	Serviceability of car parking proximity cards and automatic barriers to enter parking	2.954	0.591
22	Ease of car parking in parking lot (availability of parking spots and ability to maneuver)	2.961	0.592
23	Attendance face recognition and fingerprint system serviceability	3.191	0.638
	Average	2.494	0.499

The service with the lowest level of satisfaction is the maintenance of water fountains with an RII of 0.282. It is interesting that none of the 152 respondents are satisfied with the maintenance of the water fountains at the Ports Complex. An overwhelming majority of 69.1% are very unsatisfied, 21.1% are unsatisfied, and 9.9% are neutral. This can be explained by the fact that the prominent water fountain situated in the first floor has been out of service for years. Pictures of the malfunctioning water fountain from a site visit to the Ports Complex are in Table 4.

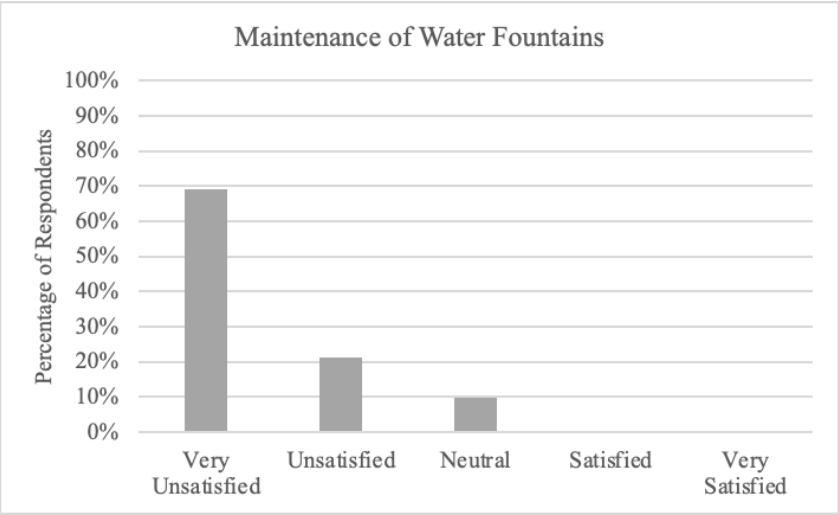

Figure 4 Maintenance of water fountains satisfaction level

The runner up for lowest satisfaction level is the cleanliness of toilets with an RII of 0.391. 35.5% of the sample are very unsatisfied, 40.1% are unsatisfied, 17.8% are neutral, and 6.6% are satisfied. None of the respondents are very satisfied with the cleanliness of toilets.

The cleanliness of the Ports Complex main building in general has an RII of 0.403. 33.6% of the sample are very unsatisfied, 36.2% are unsatisfied, 25.7% are neutral, and a minority of 4.6% are satisfied with the hygiene level of the main building. Upon visiting the Ports Complex, visual representations of the low hygiene level were captured and attached in Appendix C. Dust buildup on the visible ducts in the main lobby which have been evidently uncleaned for months prove that the cleaning procurement is unsatisfactory.

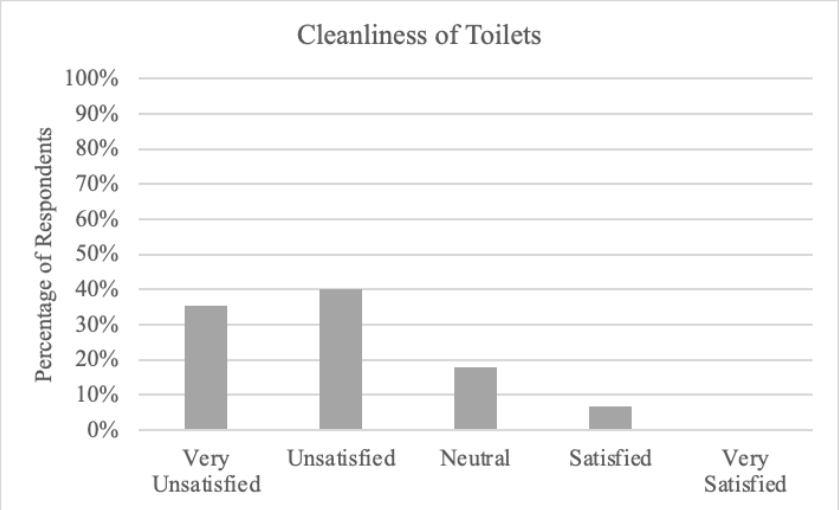

Figure 0. Level of satisfaction with the cleanliness of toilets

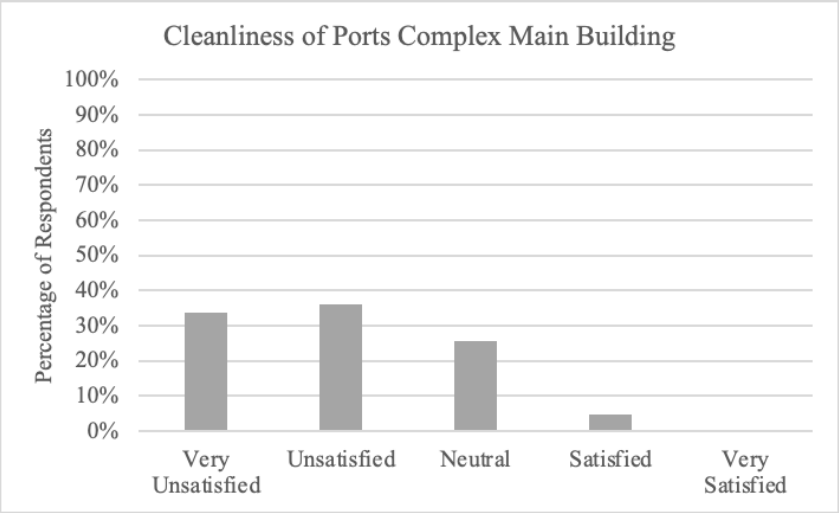

Figure 6 Level of satisfaction with the cleanliness of the main building

Communication is a key factor that affects the efficiency and productivity of an organization. When telephone networks are not functional or efficient, it serves as a major barrier that hinders communication. The majority of the end-users at the Ports Complex are unsatisfied with the efficiency of the telephone network system, with 25% very unsatisfied and 28.9% unsatisfied. 33.6% of the end users are neutral, 10.5% are satisfied, and 2% are very satisfied. The RII is equal to 0.471, which shows overall unsatisfaction. Upon the site visit, it has been confirmed that this disparity is caused by the fact that some offices have fully functional telephones whereas others have unplugged and unprogrammed telephones.

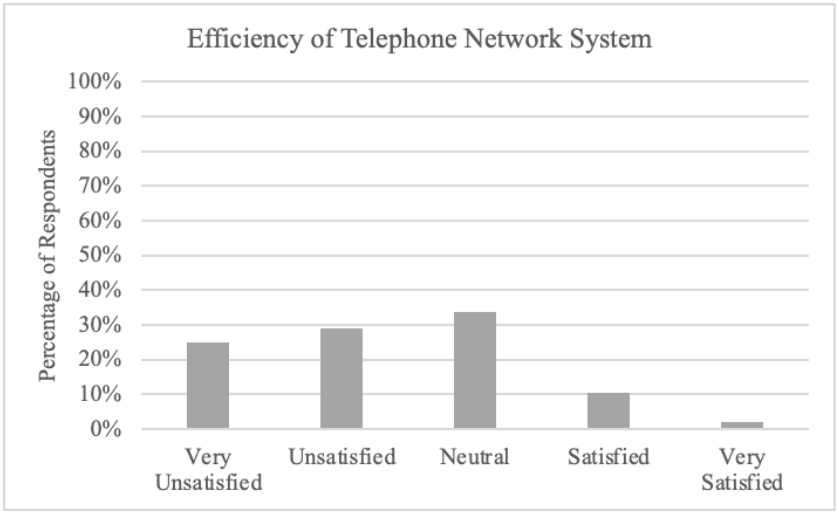

Figure 7 Satisfaction with the efficiency of telephone network

The majority of the end-users are unsatisfied with the cleanliness of the parking lot, with 13.8% very unsatisfied and 48% unsatisfied. 27.6% are neutral, 6.6% are satisfied

and 3.9% very satisfied. The proportion of respondents that expressed satisfaction are a minority. The RII is equal to 0.478, which shows overall unsatisfaction. After the site visit, this is explained by the fact that the cleaning crew are concentrated in the ground floor and basement, whereas the upper floors are only cleaned occasionally.

1	**very unsatisfied**
2	**unsatisfied**
3	**neutral**
4	**satisfied**
5	**very satisfied**

Table 4 Level of satisfaction frequencies and percentages

	How satisfied are you regarding:		**1**	**2**	**3**	**4**	**5**
1	**Cleanliness** of the Ports Complex main building	N	51	55	39	7	0
		%	33.6	36.2	25.7	4.6	0
2	**Cleanliness** of the Ports Complex parking lot	N	21	73	42	10	6
		%	13.8	48.0	27.6	6.6	3.9
3	**Cleanliness** of the toilets	N	54	61	27	10	0
		%	35.5	40.1	17.8	6.6	0
4	Responsiveness of the **cleaning crew**	N	19	61	61	5	6
		%	12.5	40.1	40.1	3.3	3.9
5	**Level of safety and security** in the Ports Complex and its offices	N	28	35	44	43	2
		%	18.4	23.0	28.9	28.3	1.3
6	Responsiveness, professionalism, and **quality of assistance of security guards** in Ports Complex	N	30	31	59	31	1
		%	19.7	20.4	38.8	20.4	0.7
7	**Level of safety** in parking lot	N	20	36	67	27	2
		%	13.2	23.7	44.1	17.8	1.3
8	**Quality of security guard assistance** in parking lot	N	32	32	53	27	8
		%	21.1	21.1	34.9	17.8	5.3
9	Ease of **car parking** in parking lot (availability of parking spots and ability to maneuver)	N	14	44	48	26	20
		%	9.2	28.9	31.6	17.1	13.2
10	Serviceability of **car parking proximity cards** and **automatic barriers** to enter parking	N	10	45	49	38	10
		%	6.6	29.6	32.2	25.0	6.6
11	Level of comfort of **indoor climate** (Considering air temperature, humidity, and air movement)	N	22	49	64	15	2
		%	14.5	32.2	42.1	9.9	1.3
12	Level of comfort of **lighting**	N	14	61	49	22	6

		%	9.2	40.1	32.2	14.5	3.9
13	Maintenance of **water leakage**	N	18	60	49	23	2
		%	11.8	39.5	32.2	15.1	1.3
14	Serviceability and maintenance of **water fountains**	N	105	32	15	0	0
		%	69.1	21.1	9.9	0	0
15	Efficiency of **telephone network system**	N	38	44	51	16	3
		%	25.0	28.9	33.6	10.5	2.0
16	Usability and maintenance of **elevators**	N	19	51	55	27	0
		%	12.5	33.6	36.2	17.8	0
17	**Maintenance** of **air conditioning, heating and ventilation** system (Considering timeliness and quality of service)	N	20	63	50	18	1
		%	13.2	41.4	32.9	11.8	0.7
18	**Maintenance** of **electric services** in Ports Complex (Considering timeliness of response to a fuse, burnt lightbulb, or other electricity issues)	N	29	51	47	20	5
		%	19.1	33.6	30.9	13.2	3.3
19	Quality and maintenance of wooden, aluminum, and metal **doors**	N	32	42	59	13	6
		%	21.1	27.6	38.8	8.6	3.9
20	**Technical support** for Kuwait Ports Authority **website and network**	N	23	62	53	11	3
		%	15.1	40.8	34.9	7.2	2.0
21	Efficiency and speed of **employee portal and other used networks**	N	26	46	67	11	2
		%	17.1	30.3	44.1	7.2	1.3
22	**Attendance** face recognition and fingerprint system serviceability	N	21	25	39	38	29
		%	13.8	16.4	25.7	25.0	19.1
23	**Maintenance** of any **malfunctioning services** (Are maintenance requests resolved completely and in a timely manner?)	N	23	45	58	24	2
		%	15.1	29.6	38.2	15.8	1.3

Conclusion and Recommendation

The results of the survey indicated that end-users of the Ports Complex are mostly unsatisfied by the maintenance of water fountains (RII = 0.282). Also, all four test elements related to cleanliness resulted in unsatisfaction of the end-users. The average RII for all test items is equal to 0.499, which proves that the end-users of the Ports Complex are unsatisfied with the overall facility services.

On the other hand, FACILITY MANAGEMENT FIRM's end-user certificates which also assess the satisfaction level of end-users received the highest possible score. This demonstrates that end-users are satisfied with the integrated facility management

services offered by FACILITY MANAGEMENT FIRM. The disparity between the results proves that there is an opportunity to significantly improve the current end-user satisfaction level and the quality of services provided at Kuwait Ports Authority by adopting integrated facilities management.

To conclude, this research recognizes the potential of integrated facility management in improving end-user satisfaction. The benefits of adopting integrated facility management are further discussed through the analysis. By optimizing facility management performance, organizations can focus on key business objectives, whilst saving costs and improving productivity through increased satisfaction.

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