

Customer Satisfaction Improvement for Sales Points of Mobile Companies with an Application Example

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Abstract. A mobile phone is a portable electronic device that uses a network of cell sites and supports SMS services for text messaging and MMS for photos and videos. This paper focuses on mobile's sales points to predict and economically schedule numbers of sales executives for highest customer satisfaction. Primary goal is to determine the best number of opened workstations to decrease customers waiting time. Data were collected from Qmatic system at a sales point in Jeddah for 2011. Simulation was done using Arena. Required data were average number of tickets taken, average service time, total number of customers served, total number of customers not show and number of resources. The best scenario attained a net profit of SR 1,509,506 with total system time of 453 seconds which was decreased by 72%. Number of unsatisfied customers was decreased by 77%, number of satisfied customers increased by 374% and net profit increased by 6.2% despite increasing number of employees.

Keywords: mobile phones, simulation, customer satisfaction

1. Introduction

The major concern of Mobily Company sales points is to reach higher customer satisfaction by decreasing total time in system for the customer. Customer satisfaction is a top priority for all service companies. A queuing system consists of one or more servers that provide service of some kind to arriving customers. Customers who arrive to find all servers busy generally join one or more queues (or lines) in front of the servers.

There are many factors affecting customer satisfaction:

- Total time in system (waiting time and service time)
- Average number of customers in queue
- Total customers not served (no-show)
- Proximity and parking availability
- Friendliness and helpfulness
- Opening and closing hours
- Seating area and appearance
- Speed of solving queries and understanding problems

This research focuses on total time in system and total customers no-show. They are the most crucial key factors of customer satisfaction and company performance measures.

1.1 Importance of the Study

Customer satisfaction is a measure of how products and services supplied by a company meet or surpass customer expectation. It is seen as a key performance indicator within business. Satisfied customers usually lead to more sales and profit, making it a strong indicator of company performance in a competitive marketplace where businesses compete for customers. Customer satisfaction is seen as a key differentiator and has increasingly become a key element of business strategy. Organizations are increasingly interested in retaining existing customers while targeting non-customers. Measuring customer satisfaction provides an indication of how successful the organization is at providing products and/or services in the marketplace.

Customer satisfaction is an ambiguous and abstract concept and the actual manifestation of the state of satisfaction will vary from person to person and from product/service to product/service. The state of satisfaction depends on a number of psychological and physical variables which correlate with satisfaction behaviors such as *return* and *recommend rate*. The level of satisfaction can also vary depending on other options the customer may have and other products against which the customer can compare the organization's products. Because satisfaction is basically a psychological state, care should be taken in the effort of quantitative measurement, although a large quantity of research in this area has recently been developed. Customer satisfaction equals perception of performance divided by expectation of performance.

The usual measures of customer satisfaction involve a survey with a set of statements using an Inert Technique or scale. Customers are asked to evaluate each statement in terms of their perception and expectation of performance of the organization being measured. In Mobily, the study and analysis of the sales points is very important to determine the state of customer satisfaction. Loosing a single customer is considered a disaster. If a customer waits for a long time in the queue to be served, there is a possibility that he/she quits or leaves and that will build bad experience in his/her mind and this might lead to a higher probability of loosing others customers. Research about the impact of satisfied and dissatisfied customers on sales experiences reveals the following facts ^[1]:

- Satisfied customers will tell an average of 5 persons about the experiences.
- Dissatisfied customers will tell about 9 persons.
- Dissatisfying experience will be remembered 10 times, while a satisfactory experience will be considered as (normal).
- 13% of the unsatisfied customers will share their unhappy experience with at least 20 persons.
- 10% of unsatisfied people never complains; they just switch to a competitor.

1.2 Scope

This study focuses on Mobily sales points. It is devoted to predicting and economically scheduling the needed numbers of sales executives and evaluating total time in the system during the year 2009 in order to reach the highest level of customer satisfaction.

1.3 Objectives of the Study

The main goal of this study is to come up with the best situation for the customer flow process in Mobily Company sales points in the year 2011. This study is concerned with decreasing total time in the system for the customer in order to reach maximum customer satisfaction.

The specific objectives of this study are to:

- Define the required data.

The required data are the average number of tickets taken, average service time, total number of customers served, total number of no-show customers and the number of resources for the past year.

- Minimize waiting time in the queue.
- Minimize average number of customers in the queue.
- Minimize total time in the system.
- Maximize resource utilization.
- Identify the required numbers of resources and their time schedules.

The first section in this paper is the introduction, importance of the study, its scope, and objectives. The second section contains literature review of related previous studies. Section 3 presents telecommunications worldwide comprising historical background, and an overview of the mobile phone, its culture, customs, and applications. Section 4 deals with telecommunications in the Kingdom of Saudi Arabia containing historical background and indicators of information and communication technology. Section 5 deals with Mobily Company, describing its services and its sales point's process. Section 6 constitutes data collection and analysis, while section 7 describes the fundamentals of Arena software and details of the simulation model. Results of the simulation model for the base case and for different scenarios are presented in section 8. The last section includes conclusions and recommendations for future research.

2. Literature Review

The impact of social identity on consumer satisfaction was investigated by Al Otaibi^[2]. It revealed that customers' relationship is a topic that has attracted much attention in the service literature. This growing attention was based on the assumption that building committed customer relationships could result in customer satisfaction, patronage and loyalty. An important research area is to look at the relationship between customer satisfaction and social identity. Social identity theory attempts to explain how self- perceived membership in a social group affects social perceptions. While social identity is important to understand social perceptions and self – identity, its application in the

context of service literature has been sparse. More specifically, the relationship between social identity and satisfaction has to the best of our knowledge not been investigated. Accordingly, the main objective of this study was to test this relationship in the context of hotels. This study sought to further our understanding as how social identity theories could be applied in the context of service interactions. This study further sought to investigate the extent to which culture has an impact on customers' satisfaction with hotel service attributes. Regression results revealed that there was a relationship between social identity and satisfaction with the service attributes.

In another research by Al-Nasser, results indicated a significant difference between Europeans and Saudi Arabians' satisfaction with service attributes^[3]. Overall, this study was a first step towards a better understanding of the impact of social relations on the evaluation of service outcomes. This research concentrated mainly on customer's satisfaction, which is considered to be a major and occasionally serious problem in the area of marketing. There is no doubt that many companies have lost their competitive advantage because they neglected to meet the specific needs or requirements of the customer. Customer satisfaction is an essential factor in improving competitive advantage. In this research, the author measured five factors: Quality requirement, Service Performance, Relationship, Price, and Invoice. These were measured from the customer's point of view, and as to whether or not the customer was satisfied, and to what specific areas their strength and weaknesses lied. This case study was applied on SABIC (Saudi Basic Industrial Corporation) company which is a well known global petro-chemical company operating world-wide.

The analysis of performance of SABIC indicated that the company's performance was exceptionally excellent in quality services and relationship aspects. However, there were a number of areas where the company was giving less attention than others. These areas were: Product packaging, processing complaints and technical support, stabilizing prices, application of EDI and the flexibility of the invoice schedule, long-term business relation with customers, and revision of price structure.

Another research examined the relationship between time orientation and time allocation^[4]. In the absence of a widely used

measure of time orientation, a questionnaire was first developed to assess the main aspects of time orientation. Time allocation was measured using a 24 hour time diary over one week. Because time allocation could be affected by a number of exogenous and endogenous variables, a narrow sampling method was adopted where age, gender, employment and education were controlled. Apart from time orientation itself, culture was chosen as an exogenous variable to affect both time orientation as well as time allocation. Culture was included in the research design by taking a sample of individuals from two nationalities, Saudi and British living in two different countries, Saudi Arabia and Great Britain.

3. Telecommunications

The mobile phone or mobile, also called a wireless, cellular phone, cell phone, or cell, is a long-range, portable electronic device used for mobile communication that uses a network of specialized base stations known as cell sites. In addition to the standard voice function of a telephone, current mobile phones can support many additional services such as SMS for text messaging, email, packet switching for access to the Internet, and MMS for sending and receiving photos and video. Today, video and TV services are driving forward third generation (3G) deployment. And in the future, low cost, high-speed data will drive forward the fourth generation (4G) as short-range communication emerges^[5].

Consumer applications are on the rise, the total value of mobile data services exceeds the value of paid services on the internet, and was worth 31 billion dollars in 2006^[6]. The largest categories of mobile services are music, picture downloads, video-gaming, adult entertainment, gambling, video/TV.

The Kingdom of Saudi Arabia had a vision for the important role of the sector of telecommunication and the necessity of utilizing modern inventions of technology. Officials in the Kingdom gave all their support and special attention to this sector and its services^[7].

Fixed telephone lines approached 4.5 millions at the end of 2009, 75% of which were residential lines (3 millions). This represents a population teledensity of 16.5% and a household teledensity (percentage of households with a telephone) of around 70% or 70 residential phones

for every 100 households ^[8]. Internet user's growth went from around 1 million in 2001 to an estimated 9 million by the end of 2009. This corresponded to a cumulative average growth rate around 36% annually.

In the mobile market, the start of completion in 2005 has resulted in major developments in terms of subscriber growth, services offerings, quality of services, customer care and reduced prices.

Telecom service revenues have been steadily growing at a cumulative average rate of around 15% annually, increasing from SR20 billion in 2001 to around 52 billion in 2009. Mobile revenue represented around 75% of all sector revenue (which is in line with trends in other countries). Figure 1 shows the growth of fixed telephone lines, mobile subscribers, internet user's growth, and overall Telecommunication Service Revenues during years 2001-2009 in Saudi Arabia^[9].

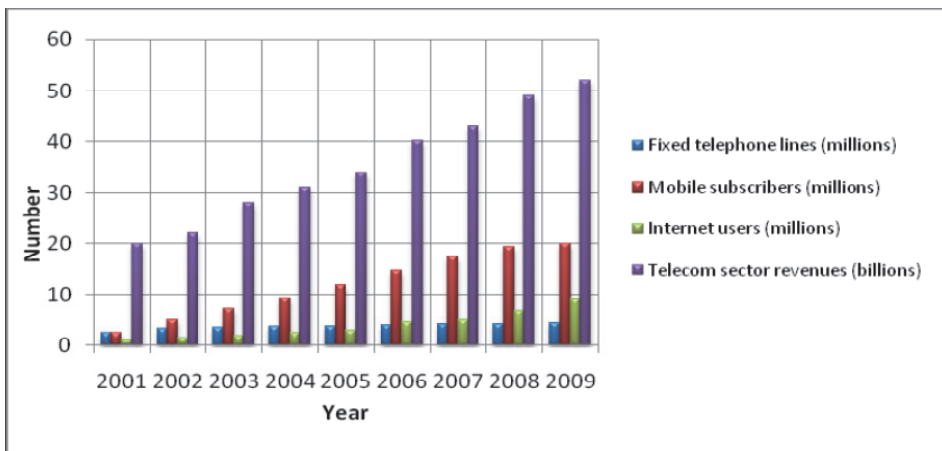


Fig. 1. Indicators of Information & Communication Technology in Saudi Arabia.

4. Mobily Telecommunication Company

In 2004, Mobily was the second telecommunication company to be introduced to the Saudi market. Today, Mobily network is in all cities and major towns. This is in addition to more than 22,000 kilometers of highways so far, covered by Mobily independent coverage. Mobily's workforce exceeded 2700 employees with 82% of them from Saudi Arabia, and was the first to introduce female sales outlets in the telecom sector^[5].

Mobily Company currently provides many services such as missed call notification, voice mail, conference call, call forwarding, call waiting, call hold, call barring, video call, streaming, 3G, SMS (Short Message System), MMS (Multimedia Message system), Friend finder, My location, SMS to TV, Bulk SMS, Saudi Stocks Quotes, WAP (Wireless Application Protocol), Internet-@- , Roaming abroad, Prepaid – top up, Postpaid – on demand bill inquiry, Credit Transfer Service – Never out of credit–, Kalemni-please call me-, Ranan-Ring back tone-, Hawwel Push To Talk-PTT-, Radeef-056-, Mobile number portability-Raqame^[10].

Once the customer visits the sales point, he has to take a ticket from the Qmatic (automated ticket taken machine) then move to get full information about products, services and promotions. Then he goes to the waiting area till his ticket number is shown on the display. The customer then is served in the workstation by a sales executive who thanks the customer and bids him farewell. Eventually, the customer leaves the sales point ^[11].

5. Data Collection and Analysis

Data were collected from one sales point in western region in Jeddah (Palestine branch) for 2011. All data were taken from the Qmatic system (automated ticket taken machine), monthly (from January to September): The max, average and min customers flow for each hour from 8:30 AM to 11:30 PM.

Table 1 shows number of tickets taken, number of customers served, and number of customers who were not served (No Show), number of payment customers served, and number of no show customers, number of update customers served, and number of no show customers.0

Table 2 shows the arrival data details from January to September from 8:30 AM to 11:30 PM. Figures 2 and 3 show the average customer arrivals from (January to September) and the percentage of customers' arrivals for each hour (8:30 AM to 11:30 PM) from January to September, respectively.

Table 3 shows the schedule of customer's services and update service's employees, the company has two shifts, the first is from 8:30 AM until 3:30 PM and the second is from 4:15 PM until 11:30 PM.

Table 1. Collected data.

Month	Tickets Taken	Customers Served	No Show	Payment Customer Served	No Show	Update Customer Served	No Show
Jan	18845	18664	181	331	8	274	17
Feb	19007	18688	319	3194	21	4332	221
Mar	18972	1879	93	2051	13	453	16
Apr	19500	19390	110	1963	15	104	6
May	19127	19035	92	2274	6	54	12
Jun	17426	17361	65	4093	16	101	12
Jul	17224	17146	78	3719	10	92	17
Aug	11958	11877	81	2730	13	65	7
Sep	8976	8931	45	1997	12	57	14
Average	16781.7	16663.4	118.2	2483.6	12.7	614.7	35.8

Table 2. Arrivals data.

TIME	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	AVG
08:30-09:30 AM	53	53	58	58	49	60	53	52	42	53.1
09:30-10:30 AM	56	56	56	60	54	59	55	51	53	55.6
10:30-11:30 AM	45	45	63	59	56	54	48	50	47	51.9
11:30-12:30 PM	39	39	42	35	37	46	51	40	33	40.2
12:30-01:30 PM	16	16	14	24	20	18	14	23	19	18.2
01:30-02:30 PM	46	46	39	43	41	37	47	37	33	41.0
02:30-03:30 PM	29	29	36	23	19	25	31	29	19	26.7
03:30-04:30 PM	41	41	37	38	40	34	35	42	31	37.7
04:30-05:30 PM	63	63	64	58	55	58	68	61	59	61.0
05:30-06:30 PM	59	59	57	56	54	62	51	62	53	57.0
06:30-07:30 PM	71	71	66	77	71	65	69	70	58	68.7
07:30-08:30 PM	57	57	55	51	49	52	52	56	47	52.9
08:30-09:30 PM	39	39	47	43	40	34	47	43	30	40.2
09:30-10:30 PM	60	60	64	72	69	56	68	64	61	63.8
10:30-11:30 PM	56	56	63	59	64	59	57	58	49	57.9

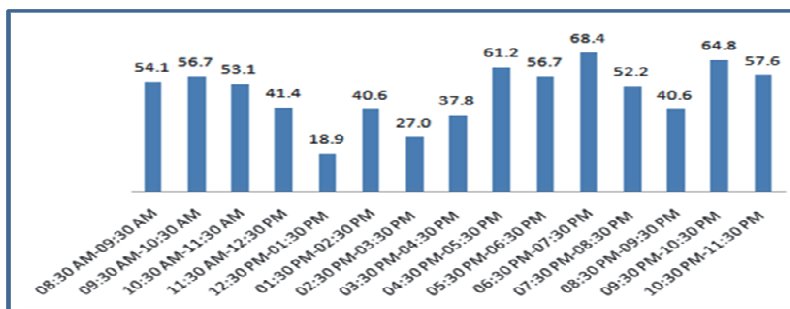


Fig. 2. Average customer arrivals (Jan-Sep).

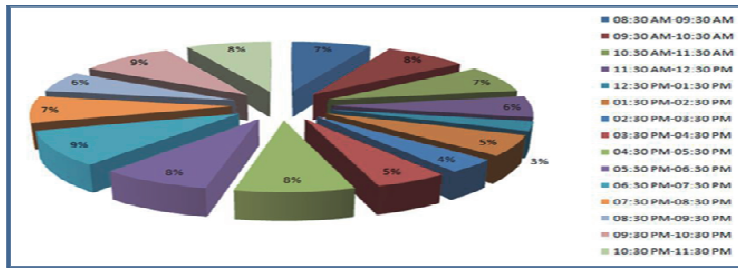


Fig. 3. Percentage of customers' arrivals for each hour

Table 3. Employee schedule for customer and update services.

Employee	Time	08:30 – 12:30	BT	1:00-03:30	BT	4:15-06:15	BT	6:30-8:00	BT	8:30–11:30
# 1-5	Cust. Serv.		BT		BT					
# 6 -11						BT		BT		
# 1	Update		BT		BT					
#2						BT		BT		

6. The Simulation Model

6.1 Computer Simulation

Broadly interpreted, computer simulation refers to methods for studying a wide variety of models of real world systems by numerical evaluation using software designed to imitate the system’s operations or characteristics, often over time. From a practical viewpoint, simulation is the process of designing and creating computerized model of a real or proposed system for the purpose of conducting numerical experiment to give us a better understanding of the behavior of that system for a given set of condition^[12].

Although it can be used to study simple systems, the real power of this technique is fully realized when used to study complex systems. While simulation may not be the only tool that could be used to study the model, it is frequently the method of choice. The reason is that simulation can be allowed to become quite complex if needed to represent the system faithfully, while we can still do the simulation analysis. Other methods may require stronger simplifying assumptions about the system to enable an analysis, which might bring the validity of the model into question^[13].

6.2 Arena Software

Arena software combines the ease of use found in high-level simulators with the flexibility of simulation languages and even on the way down to general-purpose procedural languages like the Microsoft® Visual Basic® programming system or C.

For case of display and organization, modules are typically grouped into panels to compose a template. By switching panels, one gains access to a whole different set of simulation modeling constructs and capabilities. In most cases, modules from different panels can be mixed together in the same model. To build models with Arena, one can use modeling shapes, called modules from the Basic Process panel (and perhaps other model - building panels) to define a process. There are two types of modules in the basic process panel: Flowchart modules and data modules^[14].

The Arena Business Edition represents process dynamics in a hierarchical flow chart and stores system information in data spreadsheets. Arena employs an object based design for entirely graphical model development. Simulation models are built using graphical object called modules to define system logic and physical components such as machines and operators. In addition to standard features such as resources, queues, process logic and system data, the Arena template includes modules focused on specific aspects of manufacturing and material handling systems.

Furthermore, Arena Professional Edition, Rockwell Software offers full suite of products to provide enterprise – wide simulation, optimization, and 3D model animation. A recent condition to the Arena family of products is OptQuest for Arena, an optimization software package^[13].

6.3 System Overview

When a customer arrives to Mobily Company he finds three service types which are customer, payment machine and update information services.

Branch 1: Customer service. Includes many services for customers such as new SIM, canceling SIM, bill objection, changing number, add new services like Mobily Connect, I-Phone, Blackberry and Broadband. If a customer needs any service from customer service, he can take a

ticket from Qmatic machine. Then, the customer waits until his number is appears. After that, he will go to the customer service employee. After completing his needs he leaves the branch.

Branch 2: Payment machine service. To save time and effort for both customers and employees, Mobily provides a Qmatic machine to help customers pay their bills. If a customer wants to pay his bill he can go directly to the payment machine without waiting and take his ticket from the machine.

Branch 3: Update information service. This action is carried out by the company to: 1) Keep the privacy of participants and to protect them, 2) Prevent misuse of their names by others, and 3) Avoid a number of complaints that cause continuous disturbance.

Figure 4 shows the system flow chart which clarifies the system and can be used in any simulation language^[15].

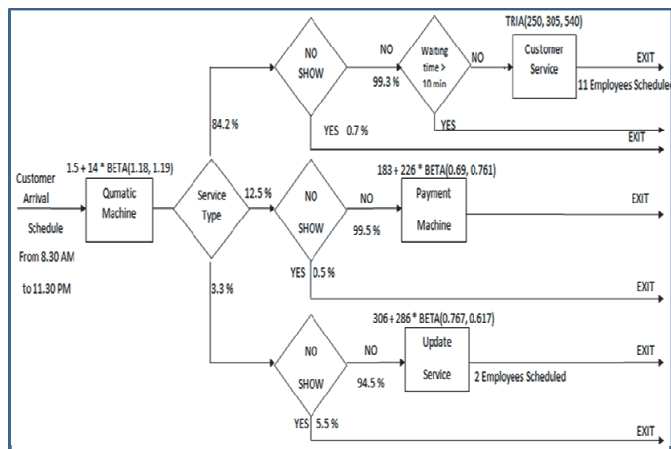


Fig. 4. The System Flow Chart.

6.4 Model Building

Customers who entered the system were distributed as follows: 84.2% entered the system for services, 12.5% entered to payment machine, and the rest went for update services.

The process time of tickets taken from the Qmatic machine gave delay time $1.5 + 14 * \text{BETA}(1.18, 1.19)$. Customers were distributed as follows: 99.3% entered the system to take services and 0.7% left the system without any services as no-show customers. As for customer

service process, the average service time was found from input analyzer to be TRIA (250, 305, 540).

Figure 5 shows results for the analysis of customer service time obtained from input analyzer which is TRIA (250, 305, 540). Customers were distributed as follows: 99.5% entered into payment machine services while 0.5% of customers left the system without any services as no-show customers. From input analyzer, it was found that the average service time for payment machines was $183 + 226 * \text{BETA}(0.69, 0.761)$.

Customers were distributed as follows: 94.5% entered for update information services and 5.5% left the system without any services as (no-show) customers. From input analyzer, it was found that the average update information service time was $306 + 286 * \text{BETA}(0.767, 0.617)$.

6.5 Model Animation

Figure 6(a) shows layout of the branch which contains customer service offices, update service offices, payment machine and Qmatic machine. The figure also shows queue for each service type, and resources working first shift (8:30 AM – 3:30 PM). Figure 6(b) shows resources working second shift (3:30 PM – 11:30 PM).

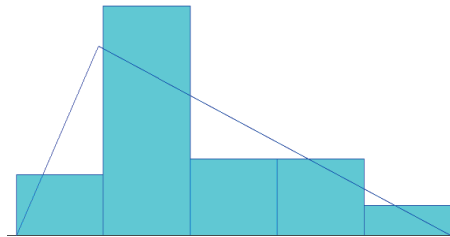
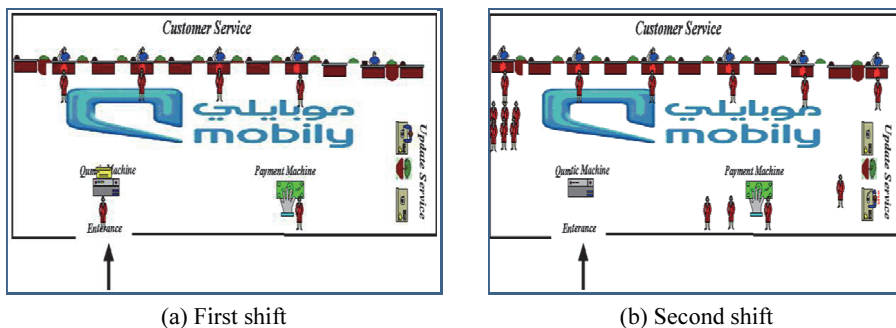


Fig. 5. Input analyzer results for the process of customer service.



(a) First shift

(b) Second shift

Fig. 6. Resource Working.

7. Simulation Results for Different Scenarios

The scenarios were divided into two Types which are:

- Type one: Dependent on employee training course which could help reduce customer service time leading to a decrease in number of unsatisfied customers in the system. From scenario 1 to scenario 4 an unsatisfied customer means a customer waiting more than 10 minutes in customers' service queue.

- Type two: Dependent on an additional number of sales executives per shift in order to reach optimal customer satisfaction from scenario 5 to scenario 9.

These scenarios are shown in Table 4.

For each scenario, results were obtained for the number of customers who waited more than 10 min, number of customers that waited less than 10 min, number of customers service no show, number of customer service served, number of payment machine no show, number of payment machine served, number of update information service no show and number of update information service served, total number seized, and the utilization of each resource.

Table 4. The Different Simulation Scenarios.

Scenarios	Service Time Reduced (Sec)	AM Shift	PM Shift
Base Case	0	0	0
Scenario 1	-15	0	0
Scenario 2	-30	0	0
Scenario 3	-45	0	0
Scenario 4	-60	0	0
Scenario 5	0	+ 1	+ 1
Scenario 6	0	+ 2	+ 2
Scenario 7	0	+ 3	+ 3
Scenario 8	0	+ 4	+ 4
Scenario 9	0	+ 5	+ 5

Fig. 7. shows total time in the system, number of customer waiting more than 10 minutes, and the net profit for all scenarios.

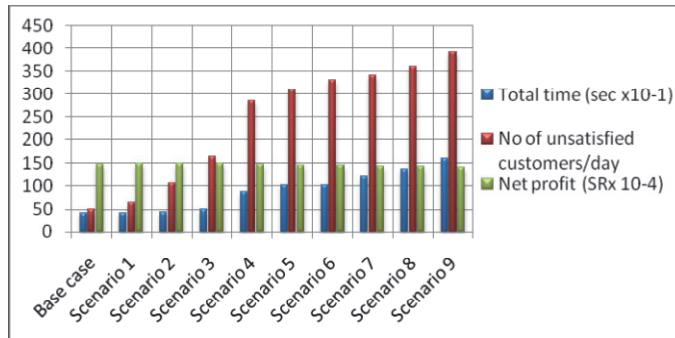


Fig. 7. Comparison between different scenarios.

The best scenario which gave maximum profit and reasonable number of unsatisfied customers was scenario7. Other scenarios were formulated by incensing and decreasing sales executives by one employee in each shift (Scenarios 10, 11, 12, and 13) as shown in Table 5.

Table 5. New Simulation Scenarios.

Scenarios	Service Time Reduced (Sec)	AM Shift	PM Shift
Scenario 10	0	+ 2	+ 3
Scenario 11	0	+ 3	+ 2
Scenario 12	0	+ 3	+ 4
Scenario 13	0	+ 4	+ 3

Figure 8 shows average waiting time in the customer service queue, number of customers waiting more than 10 minutes, and the net profit for all scenarios applied.

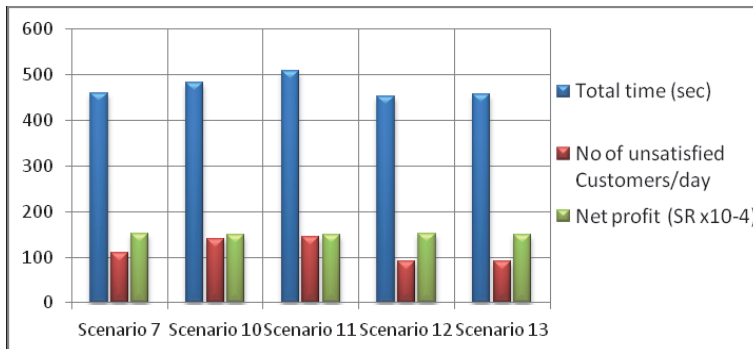


Fig. 8. Comparison Between Different Scenarios.

Results of Comparing base case (5 employees at AM shift and 6 employees at PM shift) and best scenario (8 employees at AM shift and

10 employees at PM shift) are shown in Table 5 and Fig. 9. Figure 10 shows percentage improvements for the main key performance indicators (KPI's): total time in system, number of unsatisfied customers, number of satisfied customers, losses due to leaving customers, and net profit.

Table 5. Comparison of Base Case and Best Scenario.

Scenario	Input			Output					
	Service Time Reduced (sec.)	AM shift	PM shift	Total time (sec)	Unsatisfied Cust./d	Satisfied Cust./day	Additional Salary (SR)	Loss (SR)	Net Profit (SR)
Base Case	0	0	0	1612	392	116	0	118776	1420979
Scenario 12	0	+3	+4	453	92	434	56000	83885	1509506
Improvement %				-72	-77	+374		-30	+6.23

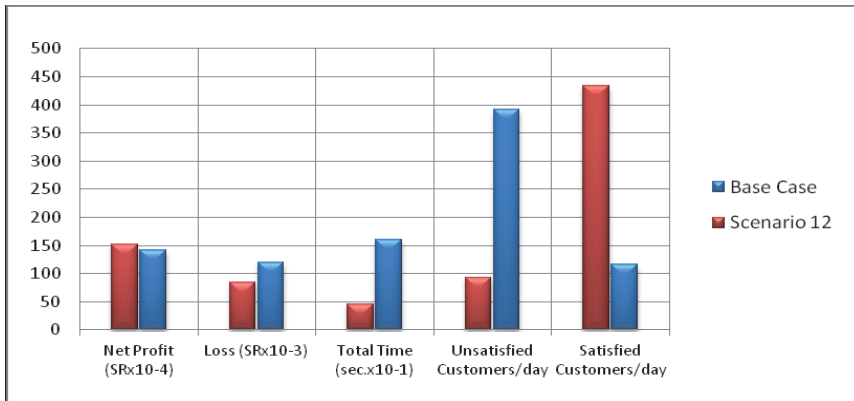


Fig. 9. Comparison between base case and scenario 12.



Fig. 10. Percentage improvements in KPI's.

8. Conclusions and Points for Future Research

8.1 Conclusions

1- Input arrivals were analyzed using the input analyzer in Arena software to obtain process distributions. Analysis results were:

- Customer Service time was TRIA (250, 305, 540).
- Payment Machine Service time was $183 + 226 * BETA (0.69, 0.761)$.
- Update Information Service time was $306 + 286 * BETA (0.767, 0.617)$.

2- A simulation model was constructed consisting of the following sub-models: customer arrivals, customer service, payment machine, and update information service.

3- Thirteen different scenarios were considered by decreasing service time due to training, and by adding additional employees.

4- The best scenario attained a net profit of SR1,509,506 with total system time 453 seconds.

5- Comparing the best scenario with the base case, the following improvements were achieved:

- * Total system time was decreased by 72%,
- * Number of unsatisfied customers was decreased by 77%,
- * Number of satisfied customers was increased by 374%, and
- * Net profit was increased by 6.2% despite increasing the number of employees.

8.2 Points for Future Research

1. Make necessary coordination of the work schedule and increase the number of staff members at peak times.

2. Recommend a perfect way to serve VIP customers without affecting workflow.

3. Apply the same procedure for other branches in Mobily Company.

4. Prepare a user-friendly decision support system to help executives use such complicated interface for decision making.

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تحسين رضا العملاء في نقاط البيع لشركات المحمول مع مثال تطبيقي

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المستخلص. الهاتف المحمول هو جهاز إلكتروني يستخدم شبكة من المواقع الخلوية ويقدم خدمات الدعم للرسائل النصية ورسائل الوسائط المتعددة للصور ومقاطع الفيديو. تركز هذه الورقة على نقاط البيع للهاتف المحمول بهدف التنبؤ والجدولة الزمنية اقتصادياً لعدد نقاط البيع المستخدمة للحصول على أعلى مستويات لرضا العملاء. الهدف الأساسي هو تحديد أفضل عدد من نقاط البيع لخفض وقت الانتظار للعملاء. وقد تم جمع البيانات من الماكينات الأوتوماتيكية عند نقطة مبيعات معينة في مدينة جدة لعام ٢٠١١م. وقد تم إجراء المحاكاة للنظام باستخدام لغة البرمجة الخاصة أرينا. البيانات المطلوبة هي متوسط عدد التذاكر التي أخذت، ومتوسط وقت الخدمة، وإجمالي عدد الزبائن الذين تم خدمتهم، وعدد الزبائن الذين يتركون النظام وعدد الموظفين. وقد حقق أفضل السيناريوهات المقترحة ربحاً صافياً قدره ١٥٠٩٥٠٦ ريال سعودي، مع وقت إجمالي للنظام قدره ٤٥٣ ثانية بنسبة تخفيض ٧٢٪. وقد انخفض عدد الزبائن الغير راضين بنسبة ٧٧٪، وارتفع عدد العملاء الراضين بنسبة ٣٧٤٪، كما ارتفع صافي الربح بنسبة ٢,٦٪ على الرغم من زيادة عدد الموظفين.