

**A BUSINESS CASE ANALYSIS OF SUITABLE  
COMPUTERISED INFORMATION SYSTEM IN  
AUCKLAND PLUMBING AND ELECTRICAL SERVICES  
(APES)**

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**ABSTRACT**

Auckland Plumbing and Electrical Services (APES) is a company that provides Plumbing and Electrical repair services to homes throughout Auckland. The company employs a total of 60 plumbers and electricians who are assigned to various jobs booked for customers on a daily basis.

The company has its head office in New Lynn and 4 branch offices in Takapuna, Manukau, Hobsonville and New Market. So in total, the company has 5 offices in Auckland. Each office has a receptionist cum store keeper whose responsibility is to perform all the administrative tasks and manage the inventory of electrical and plumbing spare parts. In addition, the head office has a total of 4 staff members, one for HR, one for Finance and Accounts, one for Purchase and one for office maintenance including the maintenance of the desktop computers that the company has. Each office staff has a desktop computer allocated to them, i.e. there are 9 desktop computers in the whole company and interconnected over the internet.

Customers call up the company's 0800 number and book service requests. The receptionist takes the request and provides a quote in terms of a rate per

hour. If the customer agrees to the rate, the job is booked and the customer is informed that a service person (electrician or plumber) will be in touch with them soon.

Depending upon the customer's location, the receptionist chooses the appropriate office of APES that will service the request and allocates the job to the next available plumber/electrician in that office. The receptionist maintains a central register to record all jobs allocated to plumbers/electricians in all its 5 offices.

Once a job is allocated to a service person (plumber/electrician), all further interactions with the customer, including planning and delivery of service are managed by the service person himself/herself. After the service is delivered and the customer has accepted the work, the service person sends across to the receptionist his/her time sheet and another docket that gives details of materials used. Using these documents the invoicing clerk in the head office prepares and sends the invoice to the customer.

### **BUSINESS NEED:**

The computer system is expected to automatically allocate jobs to service personnel based upon some well-defined business rules. Customers will have a choice of booking service requests either through the company's web site or follow the current process of calling the company's 0800 number. If customers use the web site to book service requests, the new computer system will automatically process these requests. Otherwise the receptionist will enter service requests into the computer system on behalf of customers. So that the customer gets benefited and also the sales turnover of APES increases in profit rate year by year.

### **Problem identification:**

The sales turnover of APES for the year ending 31<sup>st</sup> December 2016 was \$7.0 million. The profits were \$1.4 million (about 20% of the sales turnover).

Although the company is making good profits, the Chief Executive Officer of APES, Shankar Subramanian have noticed that

- Some of the electricians and plumbers were fully loaded all the week and the others were left free in work area. The receptionist were turned away and because of that some of the customers taught that there is not enough free staff to atten their issues.
- Company is losing about \$20,000 each month on lost sales and incorrect invoicing, which could potentially be saved by implementing a suitable computer based system and providing his staff with a suitable digital device to receive job allocation notifications and send job status information.

The added benefit of making operations more efficient and the staff more productive is by increasing the number of service requests booked and that can lead to increased sales and increased profits.

### **ALTERNATIVE SOLUTIONS CONSIDERED:**

On further investigation Shankar, the Chief Executive Officer of APES has found that his receptionist uses an EXCEL spreadsheet to register service requests and allocate jobs to the service personnel. He is not sure the extent to which the spreadsheet is updated and maintained. He is also not sure whether or not the time sheets and materials used dockets that his service personnel send to his invoice clerk are accurate.

### **Drawbacks:**

- 1) Turning down of a sizeable number of customer requests
  - 2) Inefficient system of job allocation to service personnel resulting in over-loading of some staff and under-loading of other staff
  - 3) Poor tracking of progress and status of service requests

- 4) Unable to monitor service personnel's time utilisation
- 5) Inefficient way of collecting time sheet and materials used information for invoicing.
- 6) Incorrect invoicing

## **RECOMMENDED ALTERNATIVE FOR IMPLEMENTATION**

The number of calls for service received each day varies but on an average it is about 80 and the company raises about 20,000 invoices each year. Generally every invoice is for a different customer and therefore you may assume that as many as 20,000 customers (households) call the company each year for service.

Hiring a plumbers and electrician in an agreement basis (i.e) directing the work received from the customers is rooted to the plumber / electrician near the area of the customer to attend the case and sharing the profit percentage with the APES. So that the company will have rapid development in increasing the customers and satisfied point from the customer too.

## **PROJECT BACKGROUND AND OVERVIEW:**

### **PROJECT BACKGROUND**

#### **(i) Issues faced by the company**

- Some of the electricians and plumbers are fully loaded with work on almost all days of the week while others have a lot of free time
- The receptionist was turning away
- Some of the customers thinking that there is not enough free staff to service the request

#### **(ii) Wrong/ broken/ Under Performance of the Plumber or Electrician**

- The plumbers / electrician is not sure with the extent to which the spreadsheet is updated and maintained.
- The plumbers / electrician were also not sure whether or not the time sheets and materials used dockets that his service personnel send to his invoice clerk are accurate

**(iii) Issues relate to operational performance, customers, employees, competitors, industry and market trends**

- Estimated that the APES company is losing about \$20,000 each month on lost sales and incorrect invoicing, which could potentially be saved by implementing a suitable computer based system and providing his staff with a suitable digital device to receive job allocation notifications and send job status information.
- This can also have the added benefit of making operations more efficient and the staff more productive. The number of service requests booked could improve and that can lead to increased sales and increased profits.
- The Chief executive officer Mr. Shankar Subramanian expects all his service Personnel to carry a tablet running an application that will receive notifications of jobs allocated. The service personnel will use the application to get the details of the jobs allocated and in consultation with the customer, provide the service requested. They will use the application to send progress and status information of their jobs every four hours and on completion of the job, they will use the application to send back all the information required for invoicing the customer.
- The computer system is expected to automatically allocate jobs to service personnel based upon some well-defined business rules. Customers will have a choice of booking service requests either

through the company's web site or follow the current process of calling the company's 0 800 number.

- If customers use the web site to book service requests, the new computer system will automatically process these requests. Otherwise the receptionist will enter service requests into the computer system on behalf of customers.

### **PROJECT OVERVIEW:**

Auckland Plumbing and Electrical Services (APES) is a company that provides Plumbing and Electrical repair services to homes throughout Auckland. The company employs a total of 60 plumbers and electricians who are assigned to various jobs booked for customers on a daily basis.

The company has its head office in New Lynn and 4 branch offices in Takapuna, Manukau, Hobsonville and New Market. So in total, the company has 5 offices in Auckland. Each office has a receptionist cum store keeper whose responsibility is to perform all the administrative tasks and manage the inventory of electrical and plumbing spare parts. In addition, the head office has a total of 4 staff members, one for HR, one for Finance and Accounts, one for Purchase and one for office maintenance including the maintenance of the desk top computers that the company has. Each office staff has a desk top computer allocated to them i.e. there are 9 desk top computers in the whole company and inter-connected over the internet.

Customers call up the company's 0800 number and book service requests. The receptionist takes the request and provides a quote in terms of a rate per hour. If the customer agrees to the rate, the job is booked and the customer is informed that a service person (electrician or plumber) will be in touch with them soon.

Depending upon the customer's location, the receptionist chooses the appropriate office of APES that will service the request and allocates the job to the next available plumber/electrician in that office. The receptionist maintains a central register to record all jobs allocated to plumbers/electricians in all its 5 offices.

Once a job is allocated to a service person (plumber/electrician), all further interactions with the customer including planning and delivery of service are managed by the service person himself/herself. After the service is delivered and the customer has accepted the work, the service person sends across to the receptionist his/her time sheet and another docket that gives details of materials used. Using these documents the invoicing clerk in the head office prepares and sends the invoice to the customer.

The sales turnover of APES for the year ending 31<sup>st</sup> December 2016 was \$7.0 million. The profits were \$1.4 million (about 20% of the sales turnover). Although the company is making good profits, the Chief Executive Officer of APES, Shankar Subramanian has started noticing that some of the electricians and plumbers are fully loaded with work on almost all days of the week while others have a lot of free time. Also the receptionist was turning away some of the customers thinking that there is not enough free staff to service the request.

On further investigation Shankar has found that his receptionist uses an EXCEL spreadsheet to register service requests and allocate jobs to the service personnel. He is not sure the extent to which the spreadsheet is updated and maintained. He is also not sure whether or not the time sheets and materials used dockets that his service personnel send to his invoice clerk are accurate. All this has led him to conclude that following are the pain points facing his company:

1. Turning down of a sizeable number of customer requests
2. Inefficient system of job allocation to service personnel resulting in over-loading of some staff and under-loading of other staff

3. Poor tracking of progress and status of service requests
4. Unable to monitor service personnel's time utilisation
5. Inefficient way of collecting time sheet and materials used information for invoicing.
6. Incorrect invoicing

With the help of a Business Analyst (i.e. you), Shankar has estimated that his company is losing about \$20,000 each month on lost sales and incorrect invoicing, which could potentially be saved by implementing a suitable computer based system and providing his staff with a suitable digital device to receive job allocation notifications and send job status information. This can also have the added benefit of making operations more efficient and the staff more productive. The number of service requests booked could improve and that can lead to increased sales and increased profits.

So, in early January, soon after the Christmas and New Year holidays, Shankar called his Finance Manager Greg Thompson (who has also been asked to look after IT) and directed him to look for a suitable computer system to be implemented and digital devices for his staff to use. Greg in turn has entrusted this responsibility to you to prepare a proposal for this project.

In the new way of working, Shankar expects all his service personnel to carry a tablet running an application that will receive notifications of jobs allocated. The service personnel will use the application to get the details of the jobs allocated and in consultation with the customer, provide the service requested. They will use the application to send progress and status information of their jobs every four hours and on completion of the job, they will use the application to send back all the information required for invoicing the customer.

The computer system is expected to automatically allocate jobs to service personnel based upon some well-defined business rules. Customers will have a choice of booking service requests either through the company's web site

or follow the current process of calling the company's 0 800 number. If customers use the web site to book service requests, the new computer system will automatically process these requests. Otherwise the receptionist will enter service requests into the computer system on behalf of customers.

If the need arises, the receptionist will have a facility to manually override job allocations made by the system.

APES has a web site that is currently hosted by a service provider. At this time the web site does not provide a facility to book service requests and therefore needs to be modified to include this feature.

Shankar has allocated \$600,000 as a budget for the project and wants the project completed in 6 to 8 months time.

You have found out that the following options exist for implementing the required computer system:

1. Buy a COTS package and implement. The package from Mars Software is very comprehensive and is suited for companies of the size of APES. The cost of their system is \$500,000 plus an annual maintenance cost of \$45,000 (to be paid annually for maintenance, support and upgrades). They have promised to implement the software within 4 months from the date of the contract. However, Mars software has a reputation of generally delaying their projects. There is a 25% probability of this company taking twice the amount of time committed to complete any activity in their projects. This is generally because the company has only a few good architects who are stretched quite a bit among several projects.

Mars software requires the following hardware for implementation:

One Linux based server with 32 GB RAM and 1500 GB hard disk

The latest version of SQL Server database

Five desk top PCs running either Windows 8 or 10 with 8 GB RAM and 300 GB hard drives.

The total cost of these hardware resources including networking of these is estimated to be \$25,000

- Another option is to develop a be-spoke system from ground up. This be-spoke system can also be implemented on the above hardware that is estimated to cost \$25,000. The labour effort estimated for this option is as below.

<b>Project Phase</b>	<b>Estimated Effort in Person Months</b>	<b>Break up of the effort</b>		<b>Estimated Elapsed Time in Months</b>
Analysis	5	<b>Role</b>	<b>Person Months</b>	2
		Project Manager	2	
		Business Analyst	2	
		Systems Analyst / Designer	1	
Design	2.5	<b>Role</b>	<b>Person Months</b>	1
		Project Manager	1	
		Business Analyst	0.5	
		Systems Analyst / Designer	1	

Project Phase	Estimated Effort in Person Months	Break up of the effort		Estimated Elapsed Time in Months
Development and Testing	12	<b>Role</b>	<b>Person Months</b>	3
		Project Manager	3	
		Business Analyst	1	
		Systems Analyst / Designer	2	
		Developers	4	
		Testers	2	
Implementation including user training	6	<b>Role</b>	<b>Person Months</b>	2
		Project Manager	2	
		Business Analyst	1	
		Systems Analyst / Designer	1	
		Developers	2	

Project Phase	Estimated Effort in Person Months	Break up of the effort		Estimated Elapsed Time in Months
Warranty Support	1.5	Role	Person Months	12
		Project Manager	0.3	
		Business Analyst	0.6	
		Systems Analyst / Designer	0.6	
		Developers	1.2	

The rate per hour for the different roles is as below:

Role	Rate Per Hour
Project Manager	\$135
Business Analyst	\$110
Systems Analyst / Designer	\$110
Developers	\$90
Testers	\$80

Other details: The number of calls for service received each day varies but on an average it is about 80 and the company raises about 20,000 invoices each year. Generally every invoice is for a different customer and therefore you may assume that as many as 20,000 customers (households) call the company each year for service.

**BUSINESS CASE**

**(i) PROJECT GOALS AND OBJECTIVES:**

The main objective of APES is to

1. To analyse the process of implementing a suitable computer based system and providing the staff members with a suitable digital device to receive job allocation notifications and send job status information.
2. To examine that the benefit offered to the staff members in making operations more efficient and the staff more productive.
3. To determine the number of service requests booked can be improve and that can lead to increased sales and increased profits.

**(ii) STATEMENT OF SCOPE**

The scope of the study is to analyse that the extent of the area or subject matter that something deals with or to which it is relevant that the opportunity or possibility to do or deal with something which APES increase the profit percentage by

- Increasing the sizeable number of customer requests
- Equal distribution of work allocated to staff members so that system of job allocation becomes efficient.
- The tracking of customers to progress and the status of service requests
- To monitor service personnel's time utilisation
- The efficient way of collecting time sheet and materials used information for invoicing.

**(iii) OPTIONS CONSIDERED**

- To purchase the COTS package and implement to the staff members.
- To develop a be-spoke system from ground up.
- To hire a Electrician and Plumbers in the nearby area to the customers

**(iv) JUSTIFICATION OF THE RECOMMENDED OPTION**

- a. To Buy a COTS package and implement, because generally the company has only a few good architects who are stretched quite a bit among several projects.
- b. To develop a be-spoke system from ground up. specially made for a particular customer or a special customer
- c. To hire a Electrician and Plumbers in the nearby area to the customers to attend the request and pay some commission percentage the the company, so that APES will have efficient staff members and increase in number of customers.

**(v) ESTIMATE OF TIME AND COST**

<b>Year</b>	<b>Sales Turnover</b>	<b>Profit</b>
31 <sup>st</sup> December 2016	\$7.0 Million	\$1.4 Million (about 20% of the sales turnover) Loss: \$20,000 / month on lost sales and incorrect invoicing

**BUDGET:**

Total cost allocated by APES for attaining the target profit : \$600,000  
 Estimated time for competing target profit : 6 to 8 months

**SCHEDULED PROJECTS:**

APPLICATION	IMPLEMENTATION SYSTEM
COTS package	Mars software
Be-Spoke System	Develop from ground up

**APPLICATION 1: COTS package** (from Mars Software is very comprehensive and is suited for

companies of the size of APES)

Cost of the COTS System package estimated: \$500,000

Annual maintenance cost: \$45,000

Expected time to implement the COTS package: 4 months

Lead time / delay time for the company taking twice the implementation of COTS package to complete any activity } : { 25% probability of this amount of time committed to in their projects

: \$500,000 x 25% x 2  
 : \$250,000 (for 4 months) +  
 : \$500,000 (for 8 months)

\$250,000 (for 4 months)

Total cost of these hardware resources: \$25,000

**Total cost : \$500,000+\$45,000+\$25,000 = \$570,000 in 8months**

**APPLICATION 2: Be-Spoke System** (Develop a System from Ground Up)

Project Phase	Estimated Effort in Person Months	Breakup of the effort	Estimated Elapsed Time in Months	Cost analysis

Analysis	5	<b>Role</b>	<b>Person Months</b>	2	<b>Assuming 5 days in a week and 8 hours in a day</b>
		Project Manager	2		=45 days x \$135 rate per hour x 8 hours per day = \$48,600
		Business Analyst	2		=45 days x \$110 rate per hour x 8 hours per day = \$ 39,600
		Systems Analyst / Designer	1		= 26 days x \$110 rate per hour x 8 hours per day = \$22,800
Design	2.5	<b>Role</b>	<b>Person Months</b>	1	<b>Assuming 5 days in a week and 8 hours in a day</b>
		Project Manager	1		=26 days x \$135 rate per hour x 8 hours per day = \$28,080
		Business Analyst	0.5		=13 days x \$110 rate per hour x 8 hours per day = \$11,400
		Systems Analyst / Designer	1		=26 days x \$110 rate per hour x 8 hours per day = \$22,880
Development and Testing	12	<b>Role</b>	<b>Person Months</b>	3	<b>Assuming 5 days in a week and 8 hours in a day</b>
		Project Manager	3		=66 days x \$135 rate per hour x 8 hours per day = \$71,280
		Business Analyst	1		=26 days x \$110 rate per hour x 8 hours per day = \$22,880

		Systems Analyst / Designer	2		=45 days x \$110 rate per hour x 8 hours per day =\$39,600
		Developers	4		=89 days x \$90 rate per hour x 8 hours per day =\$64,080
		Testers	2		=45 days x \$80 rate per hour x 8 hours per day =\$28,800
Implementation including user training	6	<b>Role</b>	<b>Person Months</b>	2	<b>Assuming 5 days in a week and 8 hours in a day</b>
		Project Manager	2		=45 days x \$135 rate per hour x 8 hours per day =\$48600
		Business Analyst	1		=26 days x \$110 rate per hour x 8 hours per day =\$22,880
		Systems Analyst / Designer	1		=26 days x \$110 rate per hour x 8 hours per day =\$22,880
		Developers	2		=45 days x \$90 rate per hour x 8 hours per day =\$32,400
Warranty Support	1.5	<b>Role</b>	<b>Person Months</b>	12	<b>Assuming 5 days in a week and 8 hours in a day</b>
		Project Manager	0.3		=8 days x \$135 rate per hour x 8 hours per day =\$8640
		Business Analyst	0.6		=16 days x \$110 rate per hour x 8 hours per day =\$14,080

		Systems Analyst / Designer	0.6		=16 days x \$110 rate per hour x 8 hours per day =\$14,080
		Developers	1.2		=28 days x \$90 rate per hour x 8 hours per day =\$22,320
<b>TOTAL</b>	<b>27 Months</b>			<b>20 Months – 12 months = 8 months</b>	<b>561,920 including warranty support = \$561,920 - \$52,360 = \$509,560 without warranty support</b>

**Total cost = \$509,560 in 8 months**

**(vi) ANALYSIS OF COSTS VERSUS BENEFITS**

<b>Implementation of COTS package</b>	<b>Develop Be-Spoke System from Ground Up</b>
Expected time: 8 months	Expected time: 8 months
Total cost spent: \$545,000	Total cost spent: \$526,880
Other services: \$25,000	Other services: \$25,000
Total cost: \$570,000	Total cost: \$551,880

From the above analysis implementation of COTS package is much greater than Be-Spoke system, though the expected time is almost same the APES have a risk in depending on Mars Software to implement the system on time, therefore from the analysis it is verified that developing a Be-Spoke system in APES make the staffs to allocate the job equally and satisfy the customer to have increase in profit.

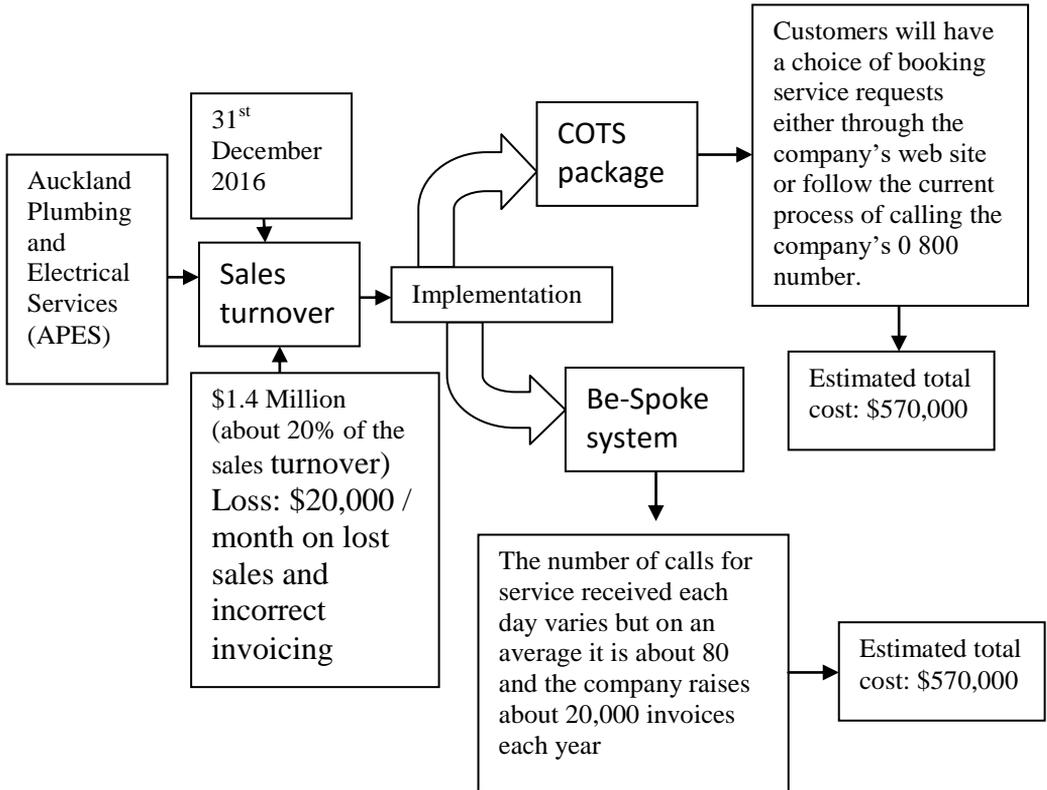
**(vii) RISK**

The risk is that when APES implement the Be-Spoke system, the staff has to take care of warranty support for another 12 months to have the satisfied customer in hand so that the APES has to concentrate on their growth gradually for each and every year.

**STAKEHOLDERS AND THEIR ROLES**

<b>COTS package</b>	<b>Be-Spoke System</b>
The package from Mars Software is very comprehensive and is suited for companies of the size of APES	system from ground up
The computer system is expected to automatically allocate jobs to service personnel based upon some well-defined business rules	The number of calls for service received each day varies but on an average it is about 80 and the company raises about 20,000 invoices each year
Customers will have a choice of booking service requests either through the company’s web site or follow the current process of calling the company’s 0 800 number. If customers use the web site to book service requests, the new computer system will automatically process these requests. Otherwise the receptionist will enter service requests into the computer system on behalf of customers.	Generally every invoice is for a different customer and therefore staff may assume that as many as 20,000 customers (households) call the company each year for service.
Estimated total cost: \$570,000	Estimated total cost: \$551,880

## Analysis of Requirements and the Primary Use Case



## Impact of the new System on the Current Business

### Business benefits:

- (i) The organization concentrates on needs and wants of the customer services
- (ii) The workload is equally distributed and made sure that the staff members are effectively productive
- (iii) The organization had made systemised to increase the invoice regularly
- (iv) To make use of electrician and plumbers in the nearby area to the customers for work

### **The competitive advantage:**

- (i) Optimization cost with better performance in all the aspect of staff members performance.
- (ii) Better utilization of workers on indentifying the level of performance within the estimated time.
- (iii) Expansion of the organisation with target achievement after analysing the estimated cost of implementing the application inside the organization

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