MANUMETAL Ltd

Quality has a name

Established 1967
Metal, Wood, Aluminum

IT Consulting Final Report

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I. Organization Overview

Company Background

Manumetal is a furniture manufacturing company located in Kigali, Rwanda. They currently have 40% of the market share in the home and office furnishing business. Their targeted customers are schools, hospitals, shops, constructions and families and they mainly service the great lake regions (Rwanda, Burundi and Republic Democratic of Congo). Manumetal's mission is to manufacture and produce affordable and quality furniture. The company currently has 60 employees and their annual revenue is approximately 1.6 million dollars USD. They plan to expand their business by manufacturing galvanized metal and solar water heaters. Manumetal has future plans to expand their business to Burundi.

One of the main goals is to demonstrate to how Manumetal can benefit from the vast selection of IT resources available to them and offer them a competitive advantage against other players in the furnishing business. Moreover, Rwanda's IT development is growing at a fast speed. Our mission is to help them take advantage of that and enhance the IT quality at their company.

Staff and Departments

Manumetal's core business is on creating custom home and office furniture designs, and offering interior design and furniture fitting services. Their production is divided in 3 separate departments: Aluminum, wood and metal. Their business supporting operations include IT, Research and Development, Commercial and Marketing, Finance as well as procurement as seen in Figure 1.
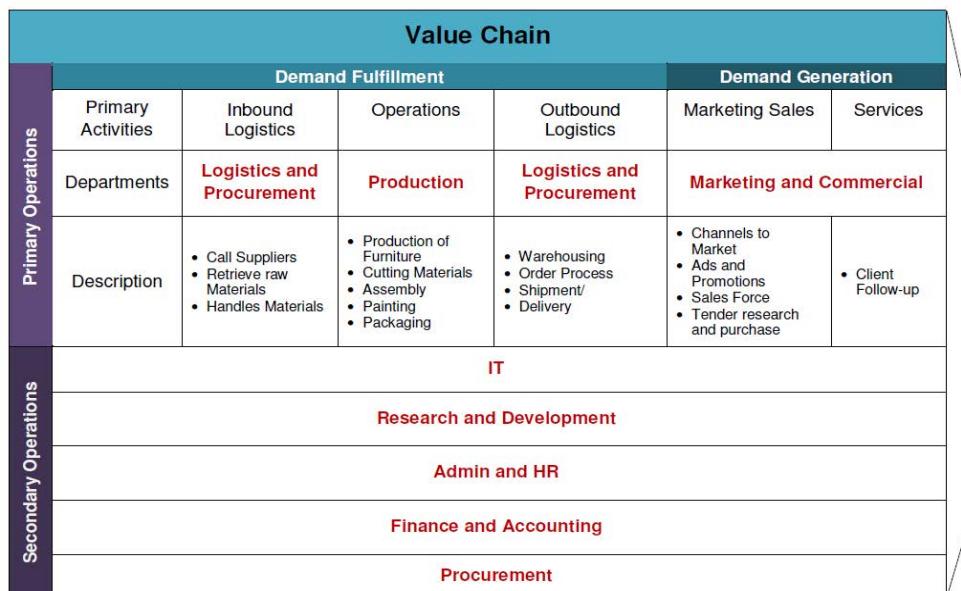
Figure 1- Five Porter's Value Chain Diagram

Manumetal currently has of 60 employees. The CEO of the company, Robert Bayigamba travels out of the country frequently, and manages the company remotely by Skype and email. The COO of the company joined 2 years ago, and the IT manager joined the company 6 months ago. The student consultant will work closely with the IT officer to analyze the company's IT infrastructure in order to improve the company's business processes. The company's departments and their relationships with each other are shown in Figure 1 and Table 1.

Table 1- List of Departmental Responsibilities

Department	Responsibilities:	Software Used
Marketing and Commercial	• Channels to Market • Advertisement/ Promotions • Sales Force • Tender research and purchase • Client Follow-up	• Excel • Word • Solid Works • QuickBooks
Production	• Production of Furniture • Cutting Materials • Assembly • Painting • Packaging	• Excel • Word
Logistics and Procurement	• Call Suppliers • Retrieve raw Materials • Handles Materials	• Excel
IT	• Daily PC Support • Networking Research on IT improvements	• Microsoft Server 2003 • Excel • Word
Research and Development	• Research and Analyze competitors, making business process improvements	• Word
Admin and HR	• Administrate tasks • Payroll • Recruitment	• Access • Excel
Finance and Accounting	• Auditing and Tax • Payment Collection	• QuickBooks • Word • Excel
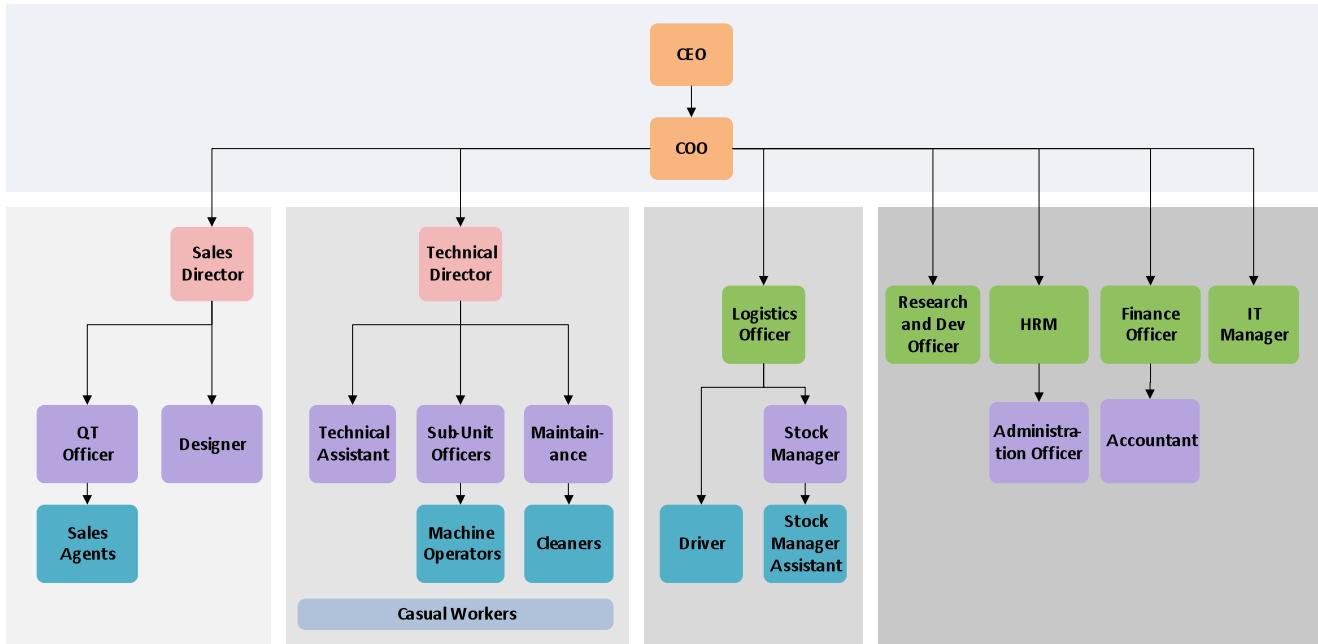
Figure 2- Company Hierarchy

Customer Relations

The marketing and commercial department handles all interaction between the company and their clients. They are responsible for reaching out to new clients, communicating with current customers and following up on completed orders.

Manumetal currently advertises through radio broadcasts and billboards .In order to obtain new projects; they search in the newspaper for furniture related tender advertisements. They go and purchase these tenders upon obtaining approvals from the management of the company. After getting the tenders, the whole department will study it together to provide a quotation for bidding. They also schedule regular visits to their clients for feedback and for possible future projects.

When customers come in for a quotation, they will first be greeted by the receptionist. If the customer wants a brand new piece of furniture designed for them, the designer will sit with them to sketch them a basic design. Then, in order to give a quotation, he will communicate with the inventory department to check the cost of materials or he can check the historical prices of the same parts from previous orders. If the customer is acquiring a quotation for a design that has previously been manufactured, then anyone inside the department can simply look up the quoted price from previous orders to give to the customer.
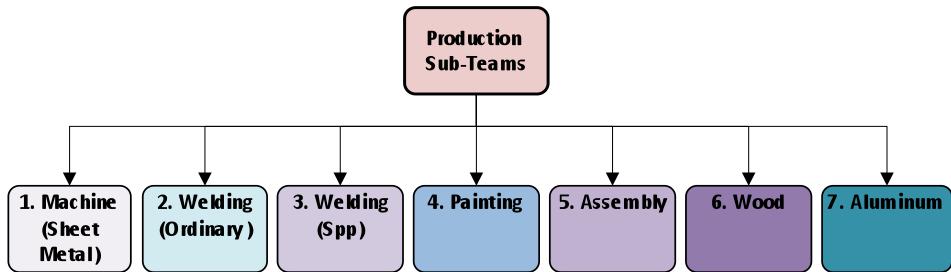
Figure 3 - Production Sub-teams.

Production Department

The technical director oversees all activities inside the factory. The production is divided into 7 different sub-units: Machine, Welding, Special Welding, Painting, Assembly, Wood and Aluminum, as seen in Figure 3. Each sub-unit has a team leader who is responsible for managing the operations within their team and organizing workflow with other sub-units. When an order form is submitted to them, the technical director will meet with all sub-unit team leaders to create a work schedule, a list of materials and a list of labor requirements for the order. If problem arises, all the team leaders will meet and work together to try to meet the deadline.

In order to attain parts for a certain order, the technical director or the technical director assistant will need to fill in a material issue slip. Upon receiving the slip, the inventory department will check their stock before handing over the material. If they don't have enough stock, or if they are low in supply, the stock manager and stock manager assistant are responsible for informing the technical director. Then, the technical director and the logistics officer will analyze and decide if more material needs to be purchased. If the material is imported from outside, they will require a longer time to ship to the factory. Sometimes, the stock manager fails to inform the technical director that their supply is low on imported materials, which cause delays in production.

Facilities

Manumetal's main office and factories are situated close to each other. Their factory offices and inventory office are located inside the two factories, as seen in Figure 5. In Rwanda, there is often power outage (on average 5 min a day) which cuts out their internet connection.
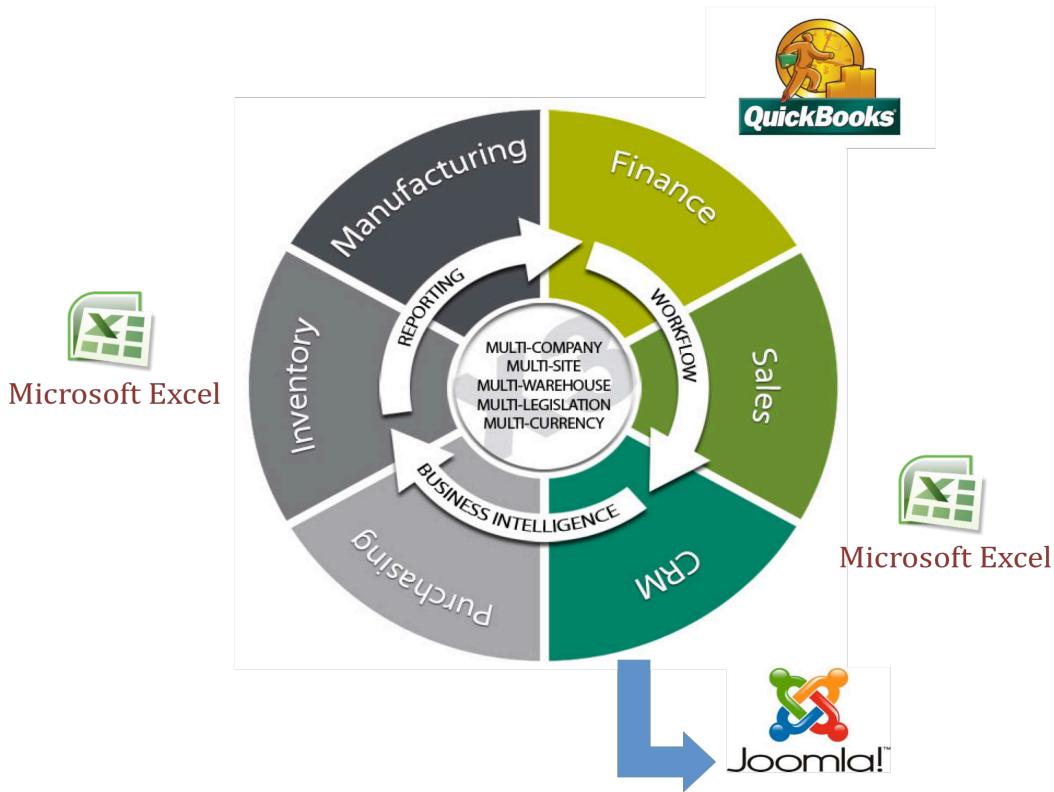
Figure 4- Software used to support operations.

Technology Infrastructure

In terms hardware, Manumetal has 20 workstations with 2 computer servers in total and their physical locations around the offices and factories is shown in Figure 5. The company currently utilizes 2 GSM modems for internet access at 128kb/s that is shared between all staff. One modem is located at the main office, and another one is located inside the factory offices, and each has their own local area network.

Company computers use either Windows XP or Windows 7 Ultimate. The different software used to manage different parts of the company is shown in Figure 4. They currently use Microsoft Excel spreadsheets to record client orders, inventory and accounting information. About a year ago, a company called Reka introduced Manumetal to QuickBooks, a business accounting software. They setup the QuickBooks system for Manumetal with SQL Server on the back end. They also trained their employees to use it for accounting and finance purposes. The data between Excel sheet and QuickBooks is not synchronized. Manumetal's HR department uses Microsoft Excel and Microsoft Access which is required by the social security board of Rwanda (MS Access database is web hosted).

Manumetal has a website set up by the previous IT officer, and it is currently non-functional. Manumetal currently has partnership with Adonal global network, which is an IT company providing web development services built on Joomla, a content management system.

Technology Management Planning

The IT officer of the company handles all IT-related issues in the company including PC support, hardware maintenance, software management and network management. Other responsibilities of IT officer include IT research and development, as well as acquiring external IT support when necessary.

The IT officer works closely with each person inside the company to gather requirements for their IT needs. However, there is no steering committee or scheduled meetings for this purpose, all IT improvements are done in an ad-hoc basis. After analyzing the requirements, he research on possible solutions and analyze what is suitable for the company. If he is unable to implement the solution himself, he is responsible for outsourcing the task to another company.

A local internet service provider just rolled out fiber optic network in Rwanda, but they are not connected to the fiber node at this point. It will take 2 months to connect to the closest fiber note and the company is speculating to see if the network will be stable. The IT officer estimates it will take another year before upgrading to a better internet bundle.

Manumetal currently has partnership with Adonal global network, which is an IT company providing web development services built on Joomla, a content management system.
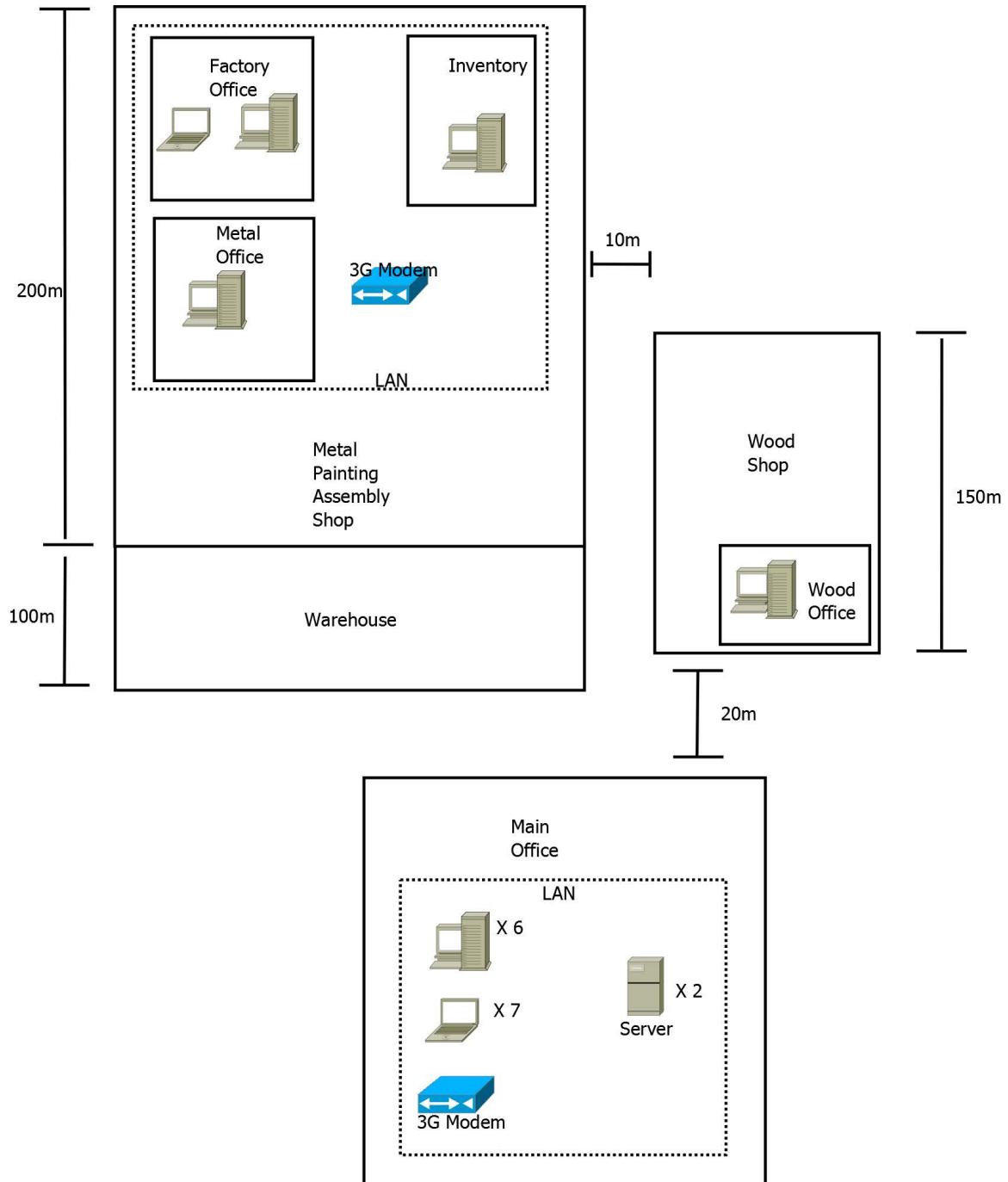
Figure 5 –Rough Sketch of Physical Layout of Manumetal (Not to scale and measurements are approximate)

Internal Communication and Information Management

Manumetal receives approximately 15 orders per month. All admin office employees have internet access and email accounts (webmail) for internal and external communication. Since the two local area networks are not connected as shown in Figure 5, employees from the main office can only email or call the employees inside the factory. When a client comes in to place an order, asides from entering it into QuickBooks, they record all related information of that particular on paper. This paper acts as a means of information sharing between the offices and the factories. Although this information is entered into the computer, it is not shared between all departments of production due to limited internet speed. A detailed information flow within the company is illustrated by the information flow diagram in Appendix A.

There are some difficulties in managing and keeping track of excess raw material or inventory because they are all stored Microsoft Excel spreadsheets. The CEO of the company is travels out of the country a lot, and the only way for him to monitor and manage the company is through email and long distance calls.

As mentioned above, when a client contacts the commercial and marketing department to request for a status update on their order, they need to call the technical director in the factories for the most up to date information. This is because internet connection is too slow and they cannot let the client wait for the email response. Since the cost of calling between the offices and factories are high, the company is planning to either using VoIP or a private automatic branch exchange (PaBX) business phone system to lower the cost of internal communication.
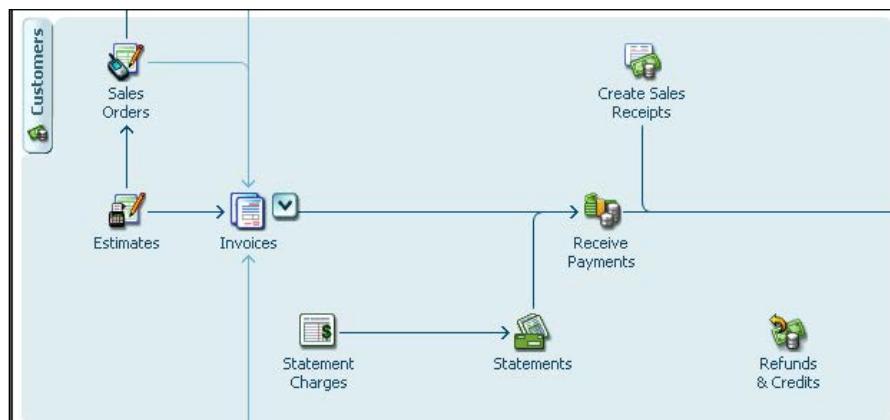
Figure 6- Flow Chart of Information Sharing inside QuickBooks

II. Improving Customer Service

Problem and Opportunity

One of the biggest challenges for Manumetal is that their current customer and order information sharing system is inefficient and disorganized. All of their customer and order data were stored in excel sheets, and every workstation has their own individual copy. This has limited Manumetal's ability in improving their customer service quality. It is an important issue to address because good customer service can provide Manumetal a competitive edge to differentiate itself from other furniture manufacturing companies in Rwanda.

The main underlying causes of the problem are:

1) Internet speed limitation and the disconnected local area networks;

2) Lack of sharing platform to handle customer and order data.

When the commercial and marketing department needs to communicate with the factory urgently, they have to either send someone over physically or call with their mobile phones. This have cost the company both time and money, and limited the company's ability to provide better customer service. It is also difficult for management to monitor customer and orders data when they are distributed in two separate local area networks. Moreover, the current system is incapable of providing management with useful analysis on customer and market data to allow the CEO to make strategic decisions.

Solutions

There are two parts to improving customer service quality

1. Internet Connection and Local Area Network Connection
2. Finding a suitable data sharing platform for the company

Internet Connection and Local Area Network Connection

There are a couple of ways to connect the two local area networks: wired, wireless and an alternative solution called HomePlug, which allows internet connection through the power cord. HomePlug is not suitable for Manumetal because the high power consumption from the machinery will prevent the company from establishing a stable connection.

To develop an internal phone connection, there are two choices. First is Voice over IP (VoIP) which requires a LAN network setup. Second is PBX, in which the infrastructure is already in place, so they just need to purchase the add-ons. **Error! Not a valid bookmark self-reference.** compares wired versus

wireless connection against a range criteria. **Error! Reference source not found.** compares VoIP and PBX against a range of criteria.

Table 2- Comparison between wired and wireless connection between the two factories

Priority	Requirements	Wired		Wireless
1	High Network Reliability	✔	Fast Speed Low Interference	Slower Speed High risk of interference due to heavy Machinery
2	Low Price	Estimated to cost about the same		
3	Easy Security Management	✔	Secure, easily manageable	Not as secure More difficult to manage
4	Simple Installation and Setup		Wiring Required: 30mSTP 4 Repeaters Metal Pole PVC Tubing	✔ No Wired Backbone: 2 Wireless Router 1 Wireless Access Point 3 Wireless LAN USB
5	Low Risk of Physical Damage	✔	Due to the exposed wire, there is a higher risk of physical damage	Low risk of physical damage
6	Connection Flexibility and Convenience		Low	✔ High
7	Long Lifetime	≈ 5 years		≈5 years

Table 3- Comparison between VoIP and PBX

	Requirements	VoIP	PBX
1	High Call Quality	If wired, good but with some latency	✔ Like regular phones
2	Low Price	150 000 RWF/ phone (about 10 phones are needed)	✔ Estimated 359 000 RWF for the entire solution
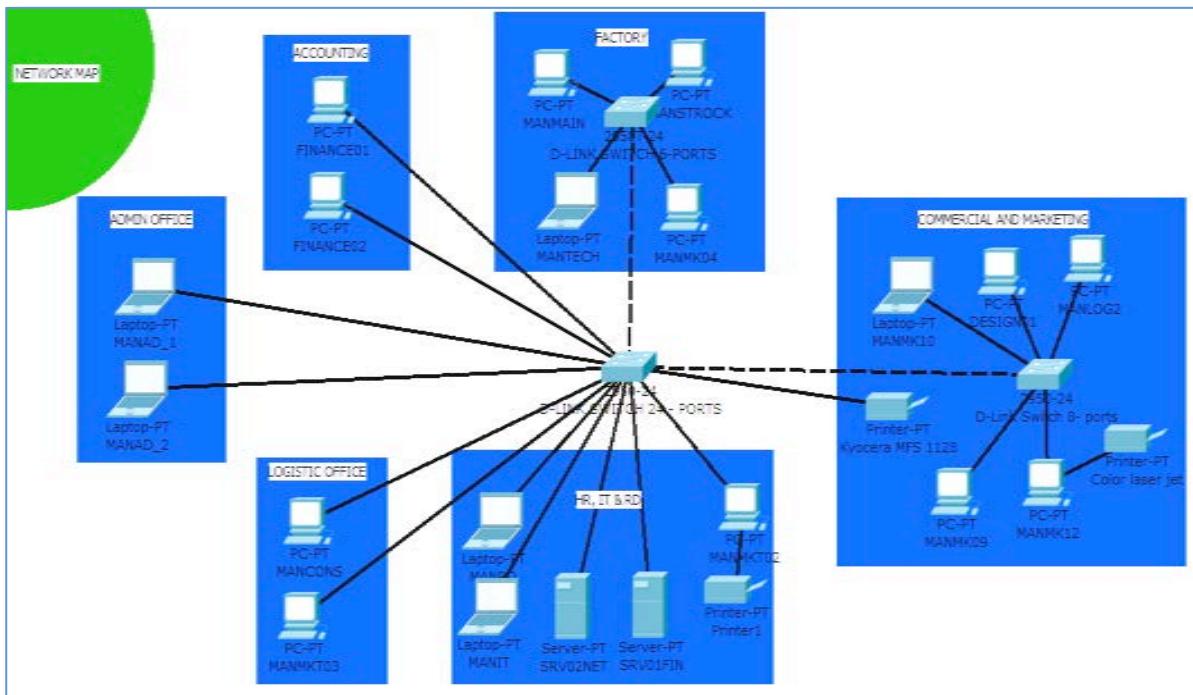
Figure 7- Proposed LAN of the company.

Finding Suitable Data Sharing Platform for the Company

The major business driver to have a customer and order data sharing platform the ability to make queries and reports easily. Another major solution requirement for Manumetal is that it should be compatible with QuickBooks, because the finance and commercial & marketing departments are currently very satisfied using it for sharing financial information (invoice, order forms… etc). They also hired a 3 party vendor to build their website with Joomla, a content management system. There is an integration cost that needs to be considered.

QuickBooks enterprise edition includes inventory tracking and payroll functionality. However, their inventory tracking functionality is not suitable for manufacturing companies (Labor cost not taken into consideration.

One possible solution is to use front end solution such as Microsoft Access to create an interface that will communicate with QuickBooks's backend database (SQL Server). The major advantage for doing this is that it is free and it is highly customizable. However, with this solution, since there is no integration software available, either the employee needs to enter the invoice data twice or the company needs to develop their own integration application. The clear disadvantage of this is that developing such solution takes a lot of design work and may be time consuming.   Second solution is to use a complete ERP solution.

Table 4- Comparison of Different Data Centralization Solution1

Priority	Requirements	ERP [1]	Open source CRM with Inventory Tracking Ability [2]	DBMS	QuickBooks Compatible Inventory Software[3]
Possible Vendor		Tally	VTiger	Microsoft Access and MS SQL Server	Advance Pro Inventory Tracking Software
1	Upfront Cost	1890 USD for the whole suite	Free	Free	$1 499
2	Integration Cost (QuickBooks and Joomla)	None.	One time middleware cost about $500 to integrate with Quickbooks. New Addon aXAccount costs 149€/$186.22	None	Separte Component from Joomla
3	Setup Difficulty	Lowest	Low	Highest Design and Setup system takes a lot of analysis and design work envolved	Low
4	Easily Managed and Maintained	Easy	Easy	Difficult to make changes and customize.	Easy
5	Easy Reporting	Supports all types of Reporting and are all presented in one location	Supports Reporting from with the CRM. Accounting reports are developed from Quickbooks	Reports has to be custom made	Supports All Types of Reporting
6	Trouble Shooting Resources	A lot resources as well as vendor support	Medium	Low. Since the system is custom designed. It is less likely others have encountered the same problem.	A lot resources and vendor support
7	Learning Curve	High. Need to learn another accounting system	Low, integrates with Quickbooks	Low, can use integrate with Quickbooks. May need enter data twice	Low, integrates with Quickbooks
8	Ability to Migrate To Saas Model	High. Tally offers cloud solution	High. Both Quickbok and VTIger offers cloud solution	Low- Integration Cost is High	High. Quickbook offers cloud solution

In this case QuickBooks will most likely be replaced by the Finance and Accounting module inside the ERP. There is an integration software that can be bought, but it will be an extra cost on top of purchasing the solution. Third solution is to use open source CRM software and host it on the server onsite. The biggest advantage is that this solution is free. The disadvantage of this solution is that integration with QuickBooks will cost money. Last solution is to use a CRM or Inventory software that is already QuickBooks compatible.

There is an alternative solution of an online CRM/ERP systems would not be feasible at the moment due to the limited internet connection. However there is a possibility for faster internet if the fiber network is stable and inexpensive, but it is estimated that it take 1 year to actually upgrade their internet connection.

their website with Joomla, a content management system. There is an integration cost that needs to be considered.

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One possible solution is to use front end solution such as Microsoft Access to create an interface that will communicate with QuickBooks's backend database (SQL Server). The major advantage for doing this is that it is free and it is highly customizable. However, with this solution, since there is no integration software available, either the employee needs to enter the invoice data twice or the company needs to develop their own integration application. The clear disadvantage of this is that developing such solution takes a lot of design work and may be time consuming.   Second solution is to use a complete ERP solution.

Table 4 shows a comparison of different solutions. Solutions being considered are under $2000

Proposing Solution to Stake Holder

After gathering and prioritizing the requirements, as well as researching about the limitations of different solutions and discussing with the IT manager, they both concluded that the best solution for Manumetal is to implement a wired local area network as seen in Figure 7 and a PBX phone system. After discussing with the IT manger, the student consultant decides that the IT manager will be responsible for this part of the plan.

In terms of data sharing platform, the IT consultant had explained the different solutions available to the management team. Both parties decided together that they will try out VTiger. The biggest factor was that it was open source, meaning that it provides flexibility at the cheapest price (free). The student consultant created a demonstration on a laptop to explain the workflow and functionality and presented it to the management team, and the workflow is shown in Appendix C. The management team was satisfied with the outcome, and ask the student consultant and the IT manager to work together to implement it on their server.
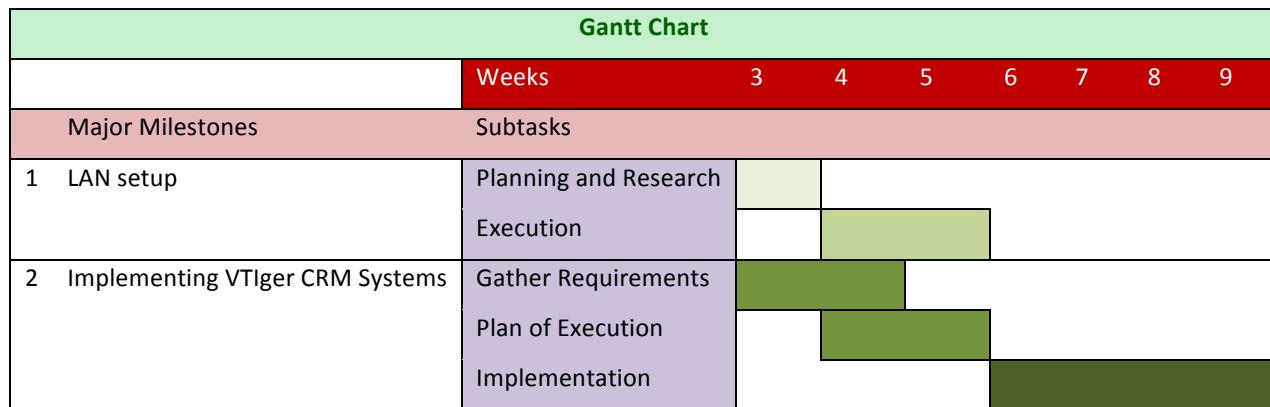
Implementation Plan

Table 5- Tasks to be completed for VTiger

Week	Tasks
1	Install php, MySql and VTiger on Microsoft IIS 6.0
	Configure Settings
	Research more on QuickBooks and how to add Rwanda Franc as a currency
	LAN

2	Import Data	
	Refine Requirements for each type of user	
	Have test users from different departments	
3	Integration with QuickBooks	
	Roll out. Install all machine for testing	
4	Run both system at once (continue on using excel, but also use VTiger)	
	Troubleshoot	
	Improvements	
5	Continue on running both system at once	
	Create future plans and recommendations	

Table 6- Proposed Plan of Execution

Gantt Chart									
	Weeks		3	4	5	6	7	8	9
Major Milestones	Subtasks								
1 LAN setup	Planning and Research								
	Execution								
2 Implementing VTIger CRM Systems	Gather Requirements								
	Plan of Execution								
	Implementation								

III. Reducing Cost of Production

Problem and Opportunity

Another issue that was issued by the client (as well as their management consultant) was that a lot of the materials were wasted during production and they wish to find a better method manage materials during production. Factory workers do not plan ahead before cutting the material, and there is no business process to manage the leftover material from a particular order. This is an important issue to address because this is an effective way to minimize cost of material for an order, which can maximize profit.

The main underlying causes of the problem are that the current work flow of the company does not allow them to efficiently manage their material and optimize material use.

Solutions

Table 7- Proposed Workflow for Production

	Flow	Sales Responsibility	Inventory Responsibilities
Pre-Production	1	Creating Order Folder	
	2	Change Production Information in Excel	
	3	Add Parts Information in Excel	
	4	Entering Information into Optimizer	
	5	Sending Information to Production	Receive Order and Cutting Information
Post-Production	6		Provide an Updated Inventory Excel sheet. Provide real production information to Sales.
	7	Import New Inventory Information into Optimizer	
	8	Calculate the real cost of production for each part based on the information given by Inventory	
	9	Update the Database of cost of parts in the Master Template.	

There are two parts to reducing the cost of production

1) Find a suitable panel cutting maximizing software

2) Build a new production workflow that will allow them use the panel cutting maximizing software.

Proposing Solution to Stake Holder

After gathering and prioritizing the requirements, and discussing with the business consultant and the CEO of the company, the student consultant and the management team decided that CutLogic2D would be the most suitable choice for Manumetal. The reason is that it allows for database backup and it has expandability (can purchase Enterprise edition to import from another database. Table 5 shows a new workflow that was been developed by the student consultant, management consultant and the IT manager to support the panel Optimization process. The details of the pre-production workflow are shown in Appendix D.

Table 8- Comparison Chart for Panel Optimization Software [4][5][6][7]

Priority		Criteria	MaxCut	Cut Master 2D	CutLogic 2D	Acesoft
	Panel Optimizing Comparison Chart					
1	Functionality	Ease of Inputting Data, and data retrieval	Each Material is saved in a different file	Each Material is saved in a different file	Uses Firebird Open Source Database as central data storage.	Uses central database
		Import and Export to Excel	✓	✓	✓	✓
		Data Backup	Manual Data Backup	Manual Data Backup	Scheduled Data backup	Scheduled Data backup
2		Price	Free	$125 for 1 workstation $160 for 2 workstation	$999 / computer for Professional Edition with ability to export and import from excel and Multi user support	Need to contact Company
3		Expandability	-	-	Can purchase the Enterprise edition to import information from another database	Able to purchase more modules. One module that may be useful is the ability to import material from AutoCAD files
5		Support	-	-	Offers software support- a service via e-mail with max two business days response time. Cost of support for one year is 15% of license fee.	PC Hardware and Software Installation and Support Available
	Summary					
Advantage			• Free	• Allows Remaining material to be entered back into database easily	• Allow Schedule Database Backup • Software support	• Has Extra features such as project management, Web/Ecommerce Development • Scheduled Database Backup • Software Support
Disadvantage			• Minimal Functionality • No scheduled data backup • Need to renew license every 30 days	• Minimal Functionality, • No scheduled data backup	• Price	• Expensive • Too many features that are too much for the company at this point • Need time to negotiate with Company

Implementation Plan

The following list represents an execution plan for using Panel Optimization software. Tasks such as searching for suitable software, developing workflow and responsibility charts were already completed by the student consultant. The IT Manager is responsible for completing all items on this list.

1. Purchase and Install Cut2Logic
2. Hold tutorials to teach employees how to use it and to explain the new workflow
3. Test the new workflow for few weeks simultaneously with the current workflow for few weeks

IV. Final Outcome

Improving Customer Service Quality

The student consultant and the IT Manager had faced a huge barrier from the start. First the IT manager were swamped with IT support, and he could not find time to setup the connection for Local Area Network. Secondly, the IT manager and the student consultant encounter problems while installing VTiger on the server. The reason for that is both the student consultant and the IT Manager had very little experience with server configurations. Moreover, with QuickBooks running on the server, it is extremely difficult to troubleshoot and debug because it is important that QuickBooks isn't effected by the installation. After two weeks of trying, the student consultant spoke to the IT manager and the CEO and decided together that the student consultant to focus on the cost reduction plan instead.

Reducing Cost of Production

The student consultant had followed her initial implementation plan to reduce the cost of production. After purchasing the Cut2Logic software and installing it on the designer's workstation, the student consultant created a tutorial on how to use the software. She first taught the designer how to use the software with her tutorial. Then, she scheduled a learning session with the inventory manager, technical director and the IT manager for the software that was lead by the designer himself. Together they learned about the new workflow and how to use the software. Manumetal were able to start using the new workflow before the student consultant leaves.
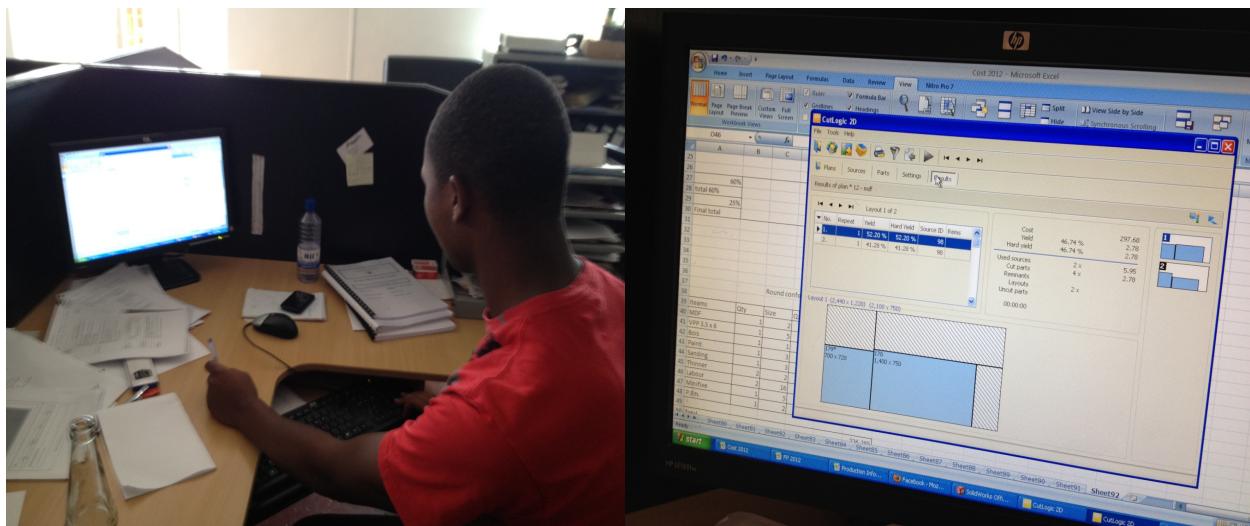

Figure 8- Designer learning how to use Cut2Logic Software

Appendix E, Appendix F, Appendix G shows the sample forms that they need to fill out before entering the information into the Cut2Logic Database.

V. Recommendations

Short term Recommendations

1. Invest in another server and Install Vtiger

    It is recommended that Manumetal invest a new server to Install Vtiger. This way it will not affect the Quickbooks server. Manmetal should also hire the Vtiger to complete the installation. It is also recommended that Manumetal assigns a person to oversee the implementation process and manage the software. The manager of the software can follow the plan of implementation lay out by the student consultant. By having a data sharing platform for customer and sales information, it allows Manumental to have an opportunity to analyze customer and market data. This is a crucial step in building a foundation for future growth of the company.

2. Use Excel VBA to Export Inventory information into the Cut2Logic Database instead of manual Entry

    It is recommended that Manumetal should either hire a consultant or provide training to the IT Manager to use Excel VBA to export inventory information into Cut2Logic Database. This will eliminate the redundant data entry work that needs to by the Inventory manager and allow him to concentrate on his other responsibilities.
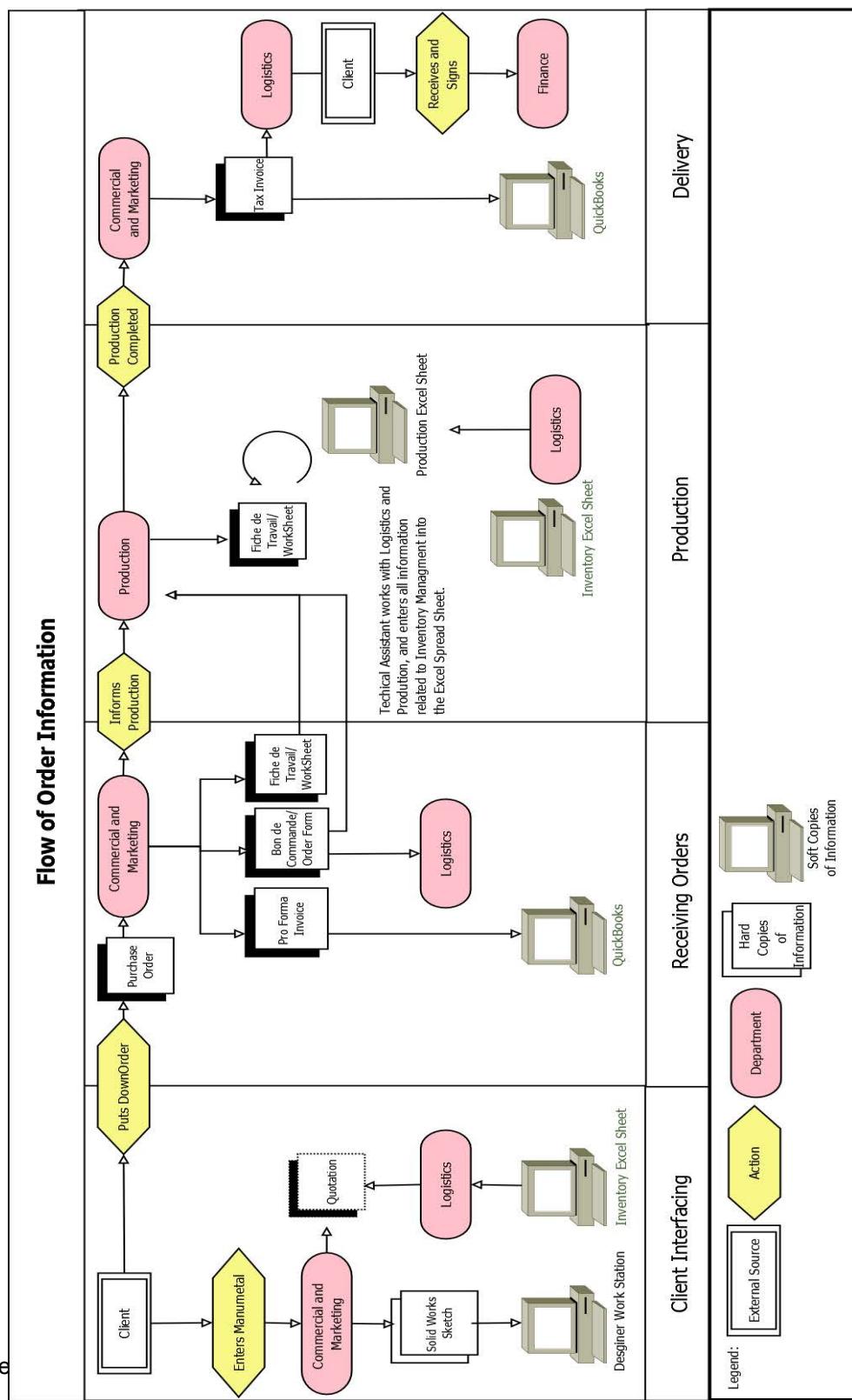
Long Term Recommendations

1. Use Ariacom Business Report to create reports from MySQL database [8]
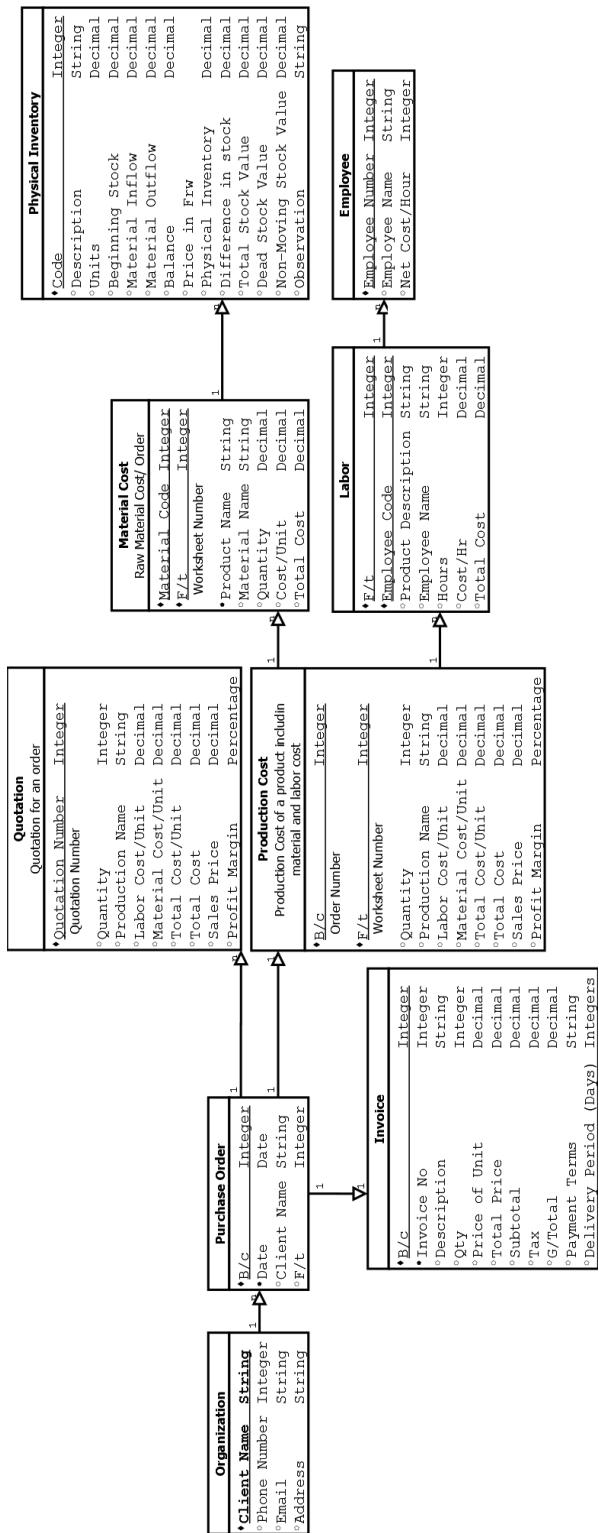
    Ariacom Business Report is a reporting tool that allows business users to create reports directly from operational data sources without having to write queries. They have a trial version that interfaces with VTiger database directly. It is recommended that Manumetal will use this tool to create reports from the customer and sales data. This will allow Manumental to have an opportunity to analyze customer and market data to provide information on the company's position in the market.

2.

Appendix A - Information Flow Diagram

Flow of Order Information

Client Interfacing | Receiving Orders | Production | Delivery

Legend:
- External Source (Action)
- Department
- Hard Copies of Information
- Soft Copies of Information

Techical Assistant works with Logistics and Prodution, and enters all information related to Inventory Managment into the Excel Spread Sheet.

Appendix B – ER Diagram

Physical Inventory

Code	Integer
Description	String
Units	Decimal
Beginning Stock	Decimal
Material Inflow	Decimal
Material Outflow	Decimal
Balance	Decimal
Price in Frw	
Physical Inventory	Decimal
Difference in stock	Decimal
Total Stock Value	Decimal
Dead Stock Value	Decimal
Non-Moving Stock Value	Decimal
Observation	String

Employee

Employee Number	Integer
Employee Name	String
Net Cost/Hour	Integer

Material Cost
Raw Material Cost/ Order

Material Code	Integer
F/t	Integer
Worksheet Number	
Product Name	String
Material Name	String
Quantity	Decimal
Cost/Unit	Decimal
Total Cost	Decimal

Labor

F/t	Integer
Employee Code	Integer
Product Description	String
Employee Name	String
Hours	Integer
Cost/Hr	Decimal
Total Cost	Decimal

Quotation
Quotation for an order

Quotation Number	Integer
Quotation Number	
Quantity	Integer
Production Name	String
Labor Cost/Unit	Decimal
Material Cost/Unit	Decimal
Total Cost/Unit	Decimal
Total Cost	Decimal
Sales Price	Decimal
Profit Margin	Percentage

Production Cost
Production Cost of a product includin material and labor cost

B/c	Integer
Order Number	
F/t	Integer
Worksheet Number	
Quantity	Integer
Production Name	String
Labor Cost/Unit	Decimal
Material Cost/Unit	Decimal
Total Cost/Unit	Decimal
Total Cost	Decimal
Sales Price	Decimal
Profit Margin	Percentage

Purchase Order

B/c	Integer
Date	Date
Client Name	String
F/t	Integer

Invoice

B/c	Integer
Invoice No	Integer
Description	String
Qty	Integer
Price of Unit	Decimal
Total Price	Decimal
Subtotal	Decimal
Tax	Decimal
G/Total	Decimal
Payment Terms	String
Delivery Period (Days)	Integers

Organization

|	
Client Name	String
Phone Number	Integer
Email	String
Address	String

Appendix C – Customer Relationship Management Workflow

Appendix D – Pre- Production Workflow

Appendix D – Production Workflow Before

Appendix E – Sample Production Order Form
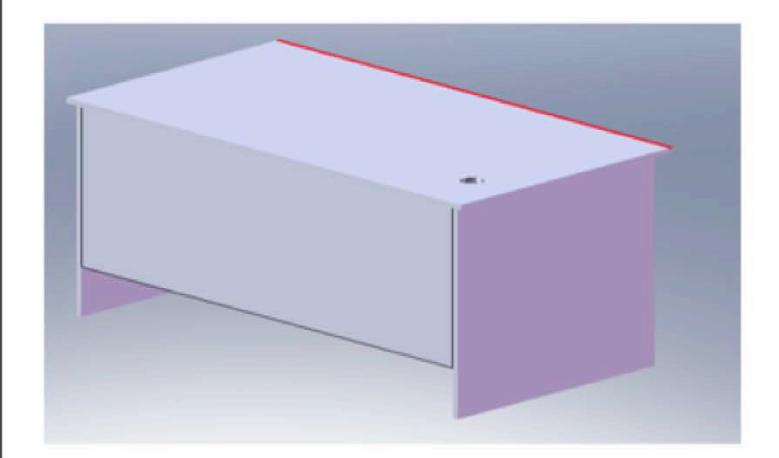
Appendix F – Sample Parts form

MANUMETAL Ltd

Quality has a name

Established   since   1967
Metal, Wood, Aluminum
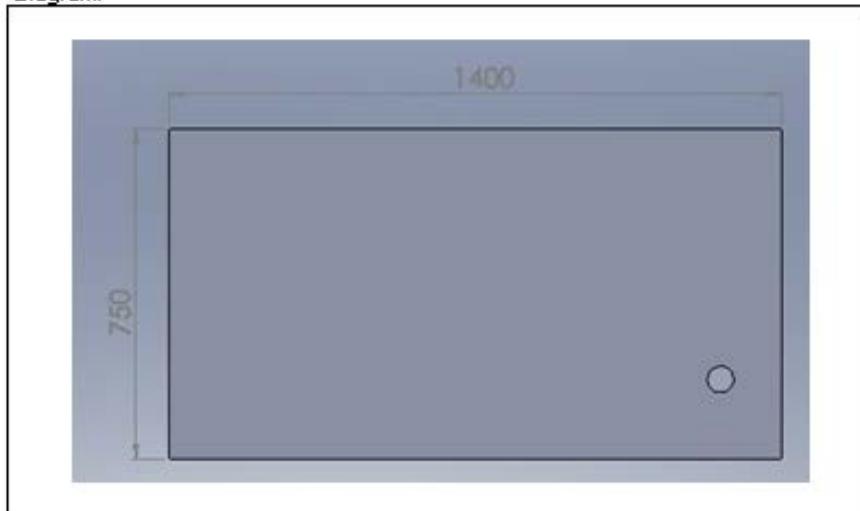
Parts Form

No:	2012-123-11223-211	Parts Description:
Part No:	211	
Date	8/1/2012	*Table top*
Delivery Date:	8/21/2012	

Diagram:

1400

750

Add Part

Parts:
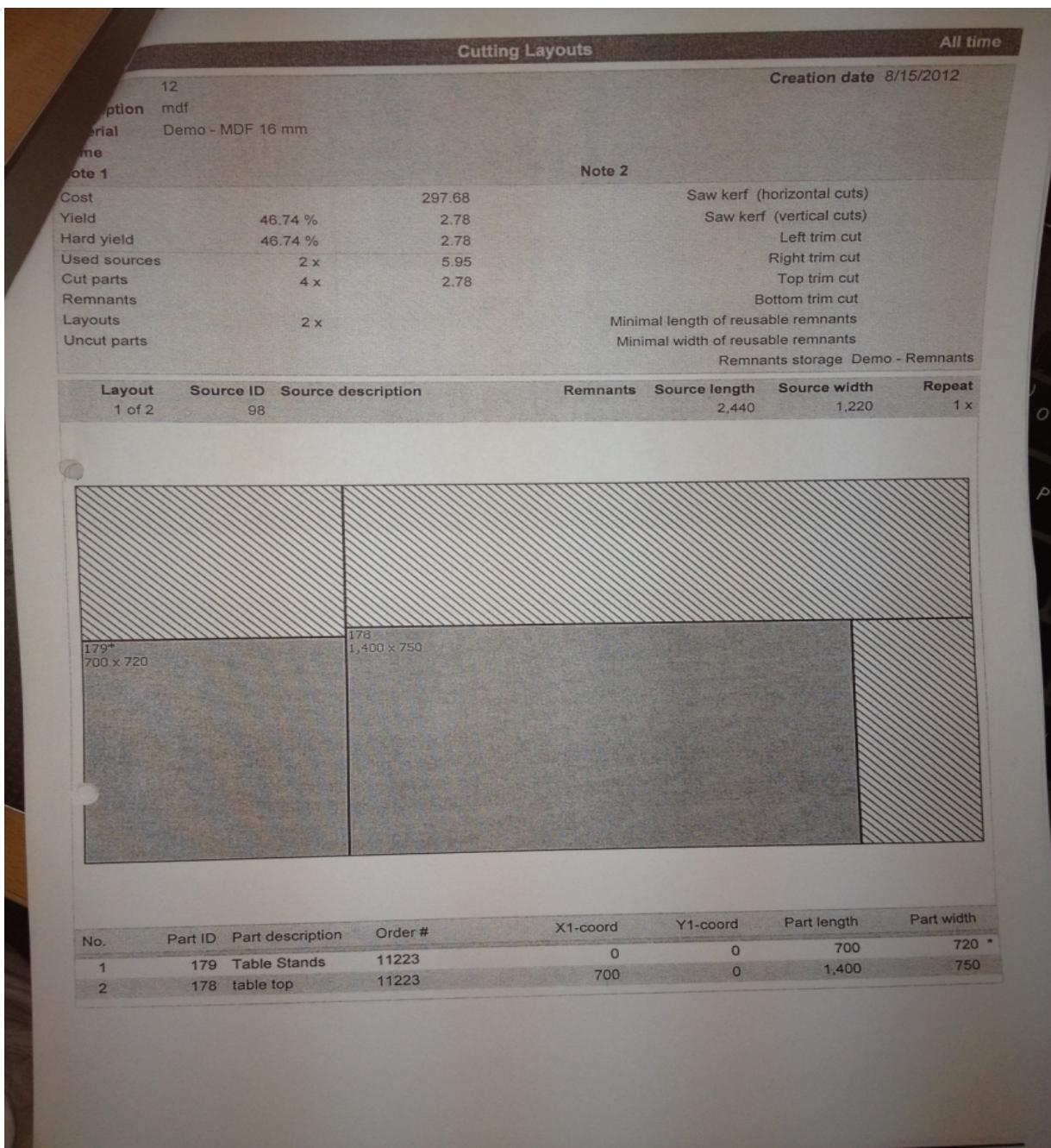
Part No	Description	Quantity	Notes
210	Table top	1	MDF

Manufacturing Instructions:

Fill in the description of the order

Signature By Technical Director: X ....

Appendix G – Sample Output from Optimization Software

Creation date 8/15/2012

12
ption   mdf
rial   Demo - MDF 16 mm
me
ote 1   Note 2

Cost		297.68	Saw kerf (horizontal cuts)	
Yield	46.74 %	2.78	Saw kerf (vertical cuts)	
Hard yield	46.74 %	2.78	Left trim cut	
Used sources	2 x	5.95	Right trim cut	
Cut parts	4 x	2.78	Top trim cut	
Remnants			Bottom trim cut	
Layouts	2 x		Minimal length of reusable remnants	
Uncut parts			Minimal width of reusable remnants	
			Remnants storage Demo - Remnants	

Layout	Source ID	Source description	Remnants	Source length	Source width	Repeat
1 of 2	98			2,440	1,220	1 x

179*
700 x 720

178
1,400 x 750

No.	Part ID	Part description	Order #	X1-coord	Y1-coord	Part length	Part width
1	179	Table Stands	11223	0	0	700	720 *
2	178	table top	11223	700	0	1,400	750

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