Using Lean Accounting in Simplifying and Modifying Financial Reports (Focus on Value Stream) – A practical Study in AL- Hayat Soft Drinks and Mineral Water Company

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Abstract

With the advent of the globalization, the rapid development in technology and the intensity of competition companies attemptto maintain competition advantages and retain customers. The traditional methods in managerial accounting become irrelevance to achieve the objectives of these companies especially with the rapid changes in modern manufacturing environment .Thus there is a need to new tools in accounting such as lean accounting, which is considered as a costing method that support creating value for the customer by costing the entire value stream, eliminating waste in the accounting process, reduced lead time, improved quality, lowered time delivery and increased available capacity. Using value stream focuses not only on the waste but also determining the sources of waste in value stream. So business manufacturing waste that occurs in the process can be easily identified. Thus the objective of the research is to bring out the concept, principles, tools and objectives of lean accounting and to discuss the issue of lean accounting as a replacement of the traditional accounting systems for cost accounting, management accounting and external financial reports. Also one of the objectives of the research is to show the procedures applied in the sample company :AL-Hayat soft drinks & Mineral Water Company. The research depends on two aspects :The Theoretical aspect which depends on references such as: books, researches ,internet and the practical aspect depends on the important formal documents of the company. This research has reached asset of conclusions of the most important:

1-Standard costing, absorption costing, activity based costing and other traditional cost accounting do not fit in with a lean accounting system because of the complexity in accounting processes of traditional systems and a high cost incurred. Just as stated in the first hypothesis of the alternative hypothesis H1.

2-Time saved over traditional manufacturing by using lean accounting in comparison with traditional manufacturing process in the sample company is 1593.2 minutes (2683.2 min-1090 min), so the company can use this available time to produce 318.64 (50 packs) or 1593.2minutes/ 5 minutes (1+1+1+1+1).just as stated in the third hypothesis of the alternative hypothesis H1.

3-The redundant number of employees in the manufacturing process in the sample company is 7 employees, the average monthly salaries of the employees in the manufacturing process is $ 676 so the company can save $4732 ($676 x7 employees) ,then we can deduce that implementing the value stream structure does not require an increase in the number of people needed but on the contrary it reduces the demand for people. Just as stated in the third hypothesis of the alternative hypothesis H1.

4-Financial and non-financial information in the box scorecard of the sample company tell managers how well they doing and help them as planning ,control and future decision making tools about the whole activities (operational, capacity, financial) of the company. Just as stated in the second hypothesis of the alternative hypothesis H1.

The most important recommendations that emerged from the research are summarized as follows:

1. Conversions from traditional accounting to lean manufacturing and lean accounting requires publishing concepts of lean accounting among employees and educate them by organizing training courses about the modern techniques of managerial accounting and requirements to apply and implement lean manufacturing.

2-The sample company has to re-arrange the manufacturing processes for the purpose of achieving the optimum flow of operations.

3-The sample company has to reconsider the number of employees working in the manufacturing processes.

4-The sample company has to take advantage of preparing income statement according to value stream costing,and preparing box score card that contains financial and non-financial information in three dimensions.

Introduction:

Accounting has evolved from being under single and double –entry across the emergence of cost accounting and managerial accounting and many modern concepts.Accounting still takes a renewed pattern under the developments that happened in the world and technology in order to keep pace with these developments .Lean accounting is one of the modern concepts that evolved from a concern that traditional accounting is inadequate and preventive to the adoption of many improvements that companies aim to achieve.

This research includes two sections: theoretical aspect and practical aspect.The theoretical aspect involves concepts, thrusts,functions,principles,advantagesand disadvantages of lean accounting, also it includes types of financial reports for lean operation such as value stream costing and box scorecard as performance measures. On the other hand thepractical aspect displays all the practical procedures in Al-Hayat soft drinks &Mineral Water Company in order to achieve the main objectives of the research.

Outline of the research

This outline describes the problem of the research, aim of the research, hypothesis of the research, importance of the research, sample of the research ,mythology of the research and model of the research.

Problem of the research:

Because of the large developments that have occurred in production, many new methods have been emerged in cost accounting and managerial accounting. But mostof these methods are still unsuitable to achieve the industrial companies' goals especially with the advent of lean production.As a result it become necessary to reconsider these methods to treat the waste incurred in time, cost and operations especially under lean production operations. Therefore the problem of the research lies in unsuitability and inability of the traditional methods in treating waste in time, cost and

operations. Also the unsuitability of traditional costing for preparing simply, timely and clearly understood financial reports by everyone in the company is because thereport prepared according to traditional costing includes misleading data relating to standard costing, variances and using absorption costing in allocating indirect costs. So can lean accounting address these issues?

Aims of the research:

The research aims toachieve the following:

1. Bringing out the concept of lean accounting, its principles, tools, and objectives.
2. Clarifying the financial reports used in lean operations.
3. Casting light on the applied procedures of value stream (as one of lean accounting tools used in lean operations) in AL-Hayat soft drinks and Mineral Water Company.

Hypothesis of the research:

In order to achieve the aims of the research, we will depend on the followinghypothesis:

Using lean accounting tools (value stream and box scorecard) lead to tackle the waste of time, cost and operations.From this hypothesis the following two sub-hypothesis can be formalized:

H0:

1-Lean accounting tools do not simplify operations.

2-Lean accounting tools do not modify financial reports to include non-financial information besides financial information.

3-Lean accounting tools do not reduce the operation elapsed time and the demand for employees.

H1:

1-Lean accounting tools do simplify operations.

2-Lean accounting tools do modify financial reports to include non-financial information besides financial information,this helps managers in planning, control, and making decision.

3-Lean accounting tools do reduce the operation elapsed time and the demand for employees.

Importance of the research:

Importance of the research lies in shed light on new concepts in managerial accounting, which is lean accounting and the possibility of its application in companies operating in Iraq generally and in Kurdistan region especially, for the purpose of directing the available resources in the companies effectively and efficiently. Also the research attempts to clarify the role of lean accounting to eliminate the waste in cost and time .

Sample of the research:

Al-Hayat soft drinks and mineral water company is selected as a sample of the research, being one of the large industrial companies belonging to the private sector in Kurdistan region.

Methodology of the research:

The research depends on two aspects in order to collect the required data and information. In theoretical aspect the research depends on foreign references such as: books, researches, conferences and references from internet. In the practical aspect the research depends on the following:

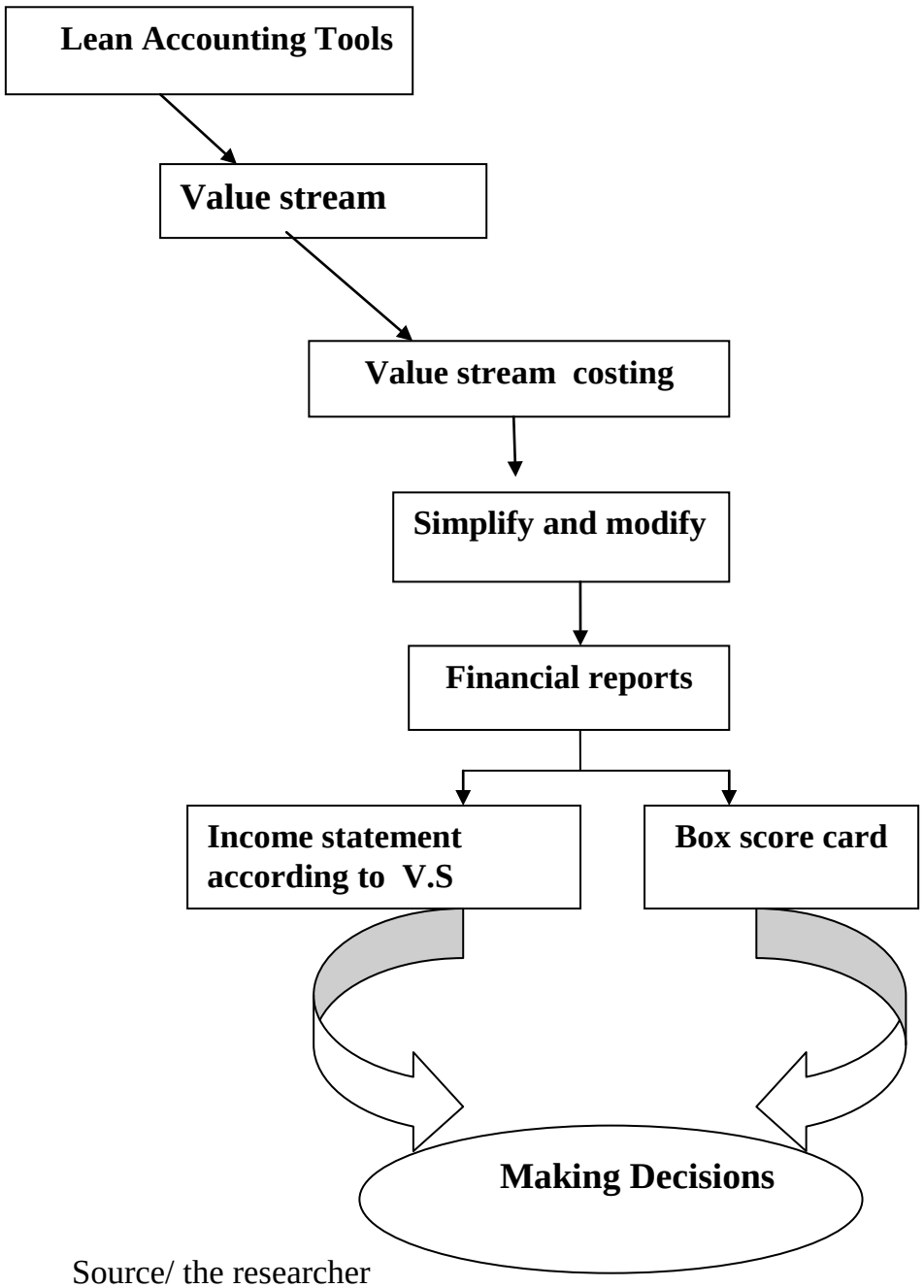
a- interviews with employees and engineers in the sample company.
b-The sampleCompany's formal documents such as: income statement, production cost reports,stock cost and stock balances, daily production run reports and other documents as shown in the appendixes of the research.

Model of the research:

According to the aim, problem and hypothesis of the study the research attempts to design a model for the research as shown in figure (1) .

Figure (1)

Model of the research



Source/ the researcher

Note: numbering system of the research is as follows:

Firstly:

1.

a.

(1)

(a)

Section One
The Theoretical Aspect

Firstly: Concept and Evolution of Lean Manufacturing

Before discussing lean manufacturing, it is necessary to address the concept of lean and lean thinking. Thus we consider what is lean: the main idea of lean is “concerned with delivering more value for the business and its customers by increasing the velocity of throughput and minimizing wasteful practices by balancing process flow”. (Aitken,No year:2).

Lean thinking is defined as “a highly evolved method of managing an organization to improve the productivity, efficiency and quality of its product or services”. (ITC,2004:1). Now we turn to what is lean manufacturing? It is defined as "a systematic approach to identifying and eliminating waste through continuous improvement, flowing the product at the pull of the customer in pursuit of perfection”. (IFS R&D,2004:4).

According to (Black&Hunter,2003:307) lean manufacturing is a manufacturing methodology based on a new system design. It enables companies to achieve continual gains in productivity (low unit costs), and satisfies customer expectations for superior quality and prompt delivery. These benefits are the result of a well-planned, agile and flexible lean manufacturing system. The watchwords for the Toyota production system are "better", "faster", and "less expensive".

Lean thinking is considered as the foundation of lean manufacturing that has a history of demonstrable benefit and is likely to have a significant impact on the business landscape. (Merwe& Thomson,2007:28). Although there are instances of rigorous process thinking in manufacturing all the way back to the arsenal in Venice in the 1450s. The first person to truly integrate on entire production process was Henry Ford, at Highland Park MI in 1913 he combined consistently interchangeable parts with standard work and moving conveyance to create what he called flow production. (Lean Enterprise Institute, No year:1). The problem with Ford's system was not the flow, but standardized product, no variation, long life cycle and demand exceeding supplythe simplest case. (Womack & Chairman, 2007:1).

As Kiichiro Toyota, TaiichiOhno and others looked at this situation in the 1930's, and just after World War II, it occurred to them that a series of simple innovations wouldenable to provide both continuity in process flow and a wide variety in product offerings. They therefore revisited Ford's original thinking, and invented the Toyota production system. Toyota is considered the leading lean exemplar in the world, it stands poised to become the largest automaker in the world in terms of sales. (Lean Enterprise Institute, No year:1)

(Russell& Taylor,2009:688) mention that TaiichiOhno is the individual generally credited with the development of lean production. The idea of producing only what you need when you need it hardly seems the basis of a

revolution in manufacturing, but the concept is simple, if you produce only what you need when you need it, then there is no room for error.

(Emiliani , 2007:33) argues that lean manufacturing (An American Creation) was developed by Toyota and other Japanese companies. Toyota executives claim that famed Toyota production system was inspired by what they learned during visits to the Ford Motor company in the 1920s and developed by Toyota leaders. As pioneer American and European companies embraced lean manufacturing methods in the late 1980s, they discovered that lean thinking must be applied to every aspects of the company including the financial and management accounting processes.

Secondly: Benefits of Lean Manufacturing

(Russell&Taylor,2009:706) found that a study of the average benefits accrued to U.S. manufactures over a five – year period from implementing lean production are impressive: 90% reductions in manufacturing cycle time, 70% reductions in inventory, 50% reduction in labor costs, and 80% reductions in space requirements. While not every company can achieve results at this level, lean production does provide a wide range of additional benefits including:

1. improved quality.
2. lower costs.
3. reduced space requirements.
4. increased productivity.
5. greater flexibility.
6. better relations with suppliers.
7. simplified scheduling and control activities.
8. increased capacity.
9. better use of human resources.
10. more product variety.

(Beckman&Rosenfield,2008:364) point out that some of the specific concepts applied in lean operations are to:

1. produce at any location only when demanded by downstream users.
2. maintain production at a constant level to the degree possible.
3. reduce lot sizes as much as possible.
4. achieve short, predictable lead times between steps.
5. position suppliers to resupply frequently and in small lots as dictated by specific assembly requests.
6. limit number of suppliers and fully interact with them.
7. integrate design cycles fully with manufacturing using concurrent engineering and reducing development lead times as much as possible.
8. reduce variability as much as possible.
9. reduce demand variation by managing it, or by leveling it using strategically placed buffers.

Thirdly: Concept of Lean Accounting

(Horngren et al,2012:726) defines lean accounting as "a costing method that support creating value for the customer by costing the entire value stream, not individual products or department, thereby eliminating waste in the accounting process".

Lean accounting is also defined as "an approach to the accounting process that involves the close consideration of the use of resources in order to take advantage of opportunities that might be overlooked otherwise considered essential if a business wishes to engage in what is known as lean manufacturing". (Maskell,No year:1).

Lean accounting concepts design to better reflect the financial performance of a company that has implemented lean manufacturing process.These may include organizing costs by value stream, changing inventory valuation techniques and modifying financial statements to include nonfinancial information. (Brosnahan,2008:1).

As mentioned above we notice that the first and third definition focus on value stream thatmeans costing is concentrated on value stream, not on product or departments.

From the previous definitions it can be said that lean accounting, is a new method of accounting used for translating lean principles into lean financial reports to minimize the consumption of resources, reduce time and labor costs and eliminate waste.

Fourthly: Thrusts of Lean Accounting:

Lean accountingconsists of two important thrusts according to(Denny&Krishnan,2012:1) they are as follows:

1. The first thrust is the application of the lean method to the company's accounting, control and measurement process. There is no big difference in reality than just applying this method to other processes. The main motive is to speed up the process, to eliminate waste and to free up the capacity. (Classof1, 2002:1).
2. The second thrust of lean accounting is to fundamentally change the accounting, control, and measurement processes so they motivate lean change of improvement, provide information that is suitable for control and decision making, give an understanding of customer value, correctly assess the financial impact of lean improvement, and are themselves simple, visual and low – waste.Therefore(Denny&Krishnan,2012:1) indicate that lean accounting does not require traditional management accounting methods like standard costing, activity – based costing, cost-plus pricing, complex transaction control systems, and untimely of confusing financial reports,so these are replaced by:.
   a. Lean – focused performance measurements.
   b. Simple summary direct costing of the value streams.
   c. Decision making and reporting using a box score.

d. Financial reports that are timely and presented in "plain English" that everyone can understand.

e. Radical simplification and elimination of transactional control systems by eliminating the need for them.

f. Eliminating traditional budgeting through monthlysales, operations, financial and planning processes (SOFP).

g. Value – based pricing.

h. Correct understanding of the financial impact of lean change.

(Wikimedia,2013:3)argues that traditional accounting techniques becomeunsuitable for lean thinking, because:

a. Theyinclude large, complex processes which require a great deal of non-value work.

b. They provide measurements and reports like labor efficiency and overhead absorption that motivate large batch production and high inventory levels.

c. They have no good way to identify the financial impact of the lean improvements taking place throughout the company, and in turn the financial reports will often show that bad things are happening when very good lean change is being made.

d. Traditional accounting reports use technical words and methods like "overhead absorption" "gross margin" and many others. These reports are not widely understood within most organizations. This may be acceptable when the financial reports are restricted to senior managers, but a lean company will seek to empower the entire workforce.

According to (BMA,2013:3), the difference between the two approaches: Lean Accounting and Traditional Accounting is explained as shown in table (1).

Table (1)
CONTRASTING LEAN ACCOUNTING AND TRADITIONAL COSTING SYSTEMS

Monthly GAAP-style Reporting (Traditional costing)	Value Stream Financial reports (Lean Accounting)	Why is this important for Lean?
Monthly reporting of company results and departmental spending against budget. These are after-the-fact and unhelpful for financial control.	Weekly and monthly income statements for each Value Stream using "Plain English" formats that people understand.	Value Stream Statements enable the value stream manger (and the VS team) to control and reduce spending and increase revenue, profit, and cash flow.
Reports understood only by the financial staff, and explained to managers and executives.	Reports understood by everyone without need for explanation. They are visually reported and clear to all.	The value stream team can use the information to make decisions that improve value stream profitability and cash flow.
Employ arcane & confusing accounting methods including Gross Margins, Cost Variances, and overhead absorption.	The value stream financial reports are shown on a single sheet of paper in "Plain English" that people can immediately use without interpretation.	When the financial information in timely and clearly shows actual impacts, the value stream teams are confident to use the information to improve financial results.
Full absorption costing and variances provide misleading information about the financial impact of lean improvements.	Value stream financial reports are used to show the actual and bottom-line financial benefits from lean improvements.	The value stream teams maximize the financial benefit for their continuous improvement. They can readily monitor actual results. so Value stream profits & cash flow are improved.
Monthly financial reports are consolidated across the cost centers, divisions, groups and up to the corporate level.	Monthly financial reports are simple to consolidate across the value streams and support areas.	Lean Accounting gives better information for the company's divisions, groups, and corporate reports.
Traditional accounting provides external reporting and complies with all statutory requirements and GAAP.	Lean Accounting provides external reporting and complies with all statutory requirements and GAAP.	Lean Accounting replaces the traditional accounting with single, lean –focused accounting, control, and measurement system.

Source: (BMA,2013:2)

Fifthly: Functions of Lean Accounting:

(Lohana,2013:39)points out that lean accounting performs numerous functions these areas follows:

1. It replaces traditional measurements with few and focused lean performance measures that motivate lean behavior at all levels of the organization.
2. It identifies the financial impact of lean improvements and establishes a strategy to maximize benefits.
3. It implements better ways to understand product costs and value stream costs, and use this cost information to drive improvement, make better business decisions and enhance profitability.
4. It saves money by eliminating large amounts of waste from the accounting, control and measurement systems.
5. It frees up the time of financial experts to work on strategic issues, lean improvement and to become change agents within the organization.
6. It focuses on the business around the value created for customers.
7. It provides simple, transparent and meaningful information for organization's needs.

Accordingly, It can be concluded that lean accounting supports lean enterprise to formulate business strategy. Lean accounting also focuses on creating value for customers and eliminating non-value added waste by using value stream costing as a tool to drive improvements in cost ,time , profitability and operations and make better decisions.

Sixthly: Principles and Tools of Lean Accounting:

(McCarron,2006:3) indicates that the principles of lean accounting areas follows:

1. Establish value in the eyes of company's customers.
2. Make value flow with no interruptions.
3. Make what the customers want when they want it (pull approach). In other words, customers pull the work through the system.
4. Search for perfection with no waste (continuous improvement).

Thus in a lean organization, the company will be organized by "Value Stream" rather than by functional department. In such an environment, the value stream manager has profit and loss responsibility. It's necessary to ensure that financial and reporting processes are aligned with the value stream.

(Waddell,2010:4) adds that lean accounting is based on a number of principles that represent a departure from traditional accounting principles:

1. Management First:

Lean accounting is based on the idea that accurate information for management analysis and decision making comes first and that financial statements in accordance with (GAAP) can be derived from the lean accounting data. Traditional management and cost accounting is the reverse of this principle.

2. Value Centered:

The most fundamental purpose of management accounting is to clearly differentiate between expenses for activities that add value and those which do not add value.

3. Value stream structured:

The value stream is the appropriate aspect within the organization for gathering, summarizing and analyzing expenses of management control and decision making. The objective of value stream is to focus resources and improvement efforts on the creation of value for customers, and the elimination of activities and expenses that do not add value to the customer.

4. Plain English language report:

Lean accounting treats virtually all costs exceptdirect material as period costs. Lean accounting simplifies the financial statements and put them in a format that is easily understood by everyone in the organization in order to more fully engage the organization at all levels to reduce non-value adding expenses. Full absorption and moving costs to the balance sheet by the matching principle are the primary culprits in creating misleading and harmful accounting information to manufacturing companies.

5. Fixed Costs:

Lean accounting is biased toward an assumption that all costs are fixed rather than variable because all costs are generally fixed in the very short term and generally variable in the long term. Since all costs are both fixed and variable and the true behaviors are like to be unknowable, the determining factor is management control. If costs are classified as variable, management has much looser control and visibility than if they were assumed to be fixed. An assumption of costs as fixed increases managerial cost control in a growing organization to a much greater degree than assuming costs are variable.

6. Elimination of Waste:

The goal of the lean manufacturer is not cost reduction so much as it is the elimination of costs that do not add value in the eyes of the customer. The objective is to continuously improve the value added ratio by eliminating waste and devoting an ever increasing share of money spent to activities that create value for customers while holding the sales to value added ratio steady or even improving it.Any decrease in this ratio is an indication that the activities, as the firm believes, adds value in the eyes of the customer is mistaken.

7. Sales,Operations,Financial andPlanning (SOFP):

SOFP is typically done all the time on a monthly basis and is a comprehensive, companywide process for short –and medium – term planning. SOFP is a formal and rigorous planning process completed for each value stream. Sales and marketing provide forecasts for the number of products that will be sold by a value stream each month for the next 12 months.

(Maskell& Baggaley,2006:37) say that the operationalpeople provide forecasts of the value stream capacity each month for the next 12 months, and

product engineering brings the plans for new product introduction. Through a series of formal, tightly-scheduled meetings the customer demand is matched by production capabilities.

The SOFP team meeting is normally attended by senior management, as well as the cross functional leaders of the value stream. Senior management participate in an SOFP team meeting with each value stream in the company, and often there is a higher level SOFP team meeting in which all of the value stream managers meet with senior management to review a consolidated (SOFP) team plan. The scope of the SOFP activity includes both financial and non-financial performance indicators- often additional items are tracked and through the (SOFP) process of a strategic nature. These might include the status of new product development efforts, or the status of new equipment or computer software acquisitions (Waddell, 2010: 9).

According to (Maskell&Baggaley,2006:37) the principles, practices and tools of lean accounting summarized in table (2) are separated into five principles A – E, and for each principle there are several practices and tools of lean accounting they are as follows:.

Table(2)
Principles, practices & tools of lean accounting

PRINCIPLES	PRACTICES	TOOLS OF LEAN ACCOUNTING
A. Lean & simple business accounting	1. Continuously eliminate waste from the transactions processes, reports, and other accounting methods	a. Value stream mapping: current & futures state b. Kaizen (lean continuous improvement) c. Plan-Do-Check-Act (PDCA) problem solving
B. Accounting processes that support lean transformation	1. Management control & continuous improvement	a. Performance Measurement Linkage Chart; linking metrics for cell/process, value streams, plant & corporate reporting to the business strategy, target costs, and lean improvement b. Value stream performance boards containing break-through and continuous improvement projects c. Box scores showing value stream performance
	2. Cost management	a. Value stream costing b. Value stream income statements
	3. Customer & supplier value and cost management	a. Target costing
C. Clear & timely	1. Financial reporting	a. "Plain English Language"

communication of information		financial statements b. Simple, largely cash-based accounting
	2. Visual reporting of financial & non-financial performance measurements	a. Primary reporting using visual performance boards: division, plant, value stream, cell/process in production, product design, sales/ marketing, administration, ect.
	3. Decision – making	a. Incremental cost & profitability analysis using value stream costing and box scores
D. Planning from a lean perspective	1. Planning & budgeting	a. Hoshin policy deployment b. Sales, operations, & financial planning (SOFP)
	2. Impact of lean improvement	a. Value stream cost and capacity analysis b. Current state & future state value stream maps c. Box scores showing operational, financial, and capacity changes form lean improvement, plan for financial benefit from the lean changes
	3. Capital planning	a. Incremental impact of capital expenditure on value stream box-score. Often used with 3P approaches-(Production Preparation Process).
	4. Invest in people	a. Performance measurements tracking continuous improvement participation employee satisfaction, & cross-training b. Profit sharing
E. Strengthening internal accounting control	1. Internal control based on lean operational controls	a. Transaction elimination matrix b. Process maps showing controls and SOX risks -(Sarbanes Oxley)
	2. Inventory valuation	a. Simple methods to value inventory without the requirement for perpetual inventory records and product costs can be used when the inventory is low and under visual control.

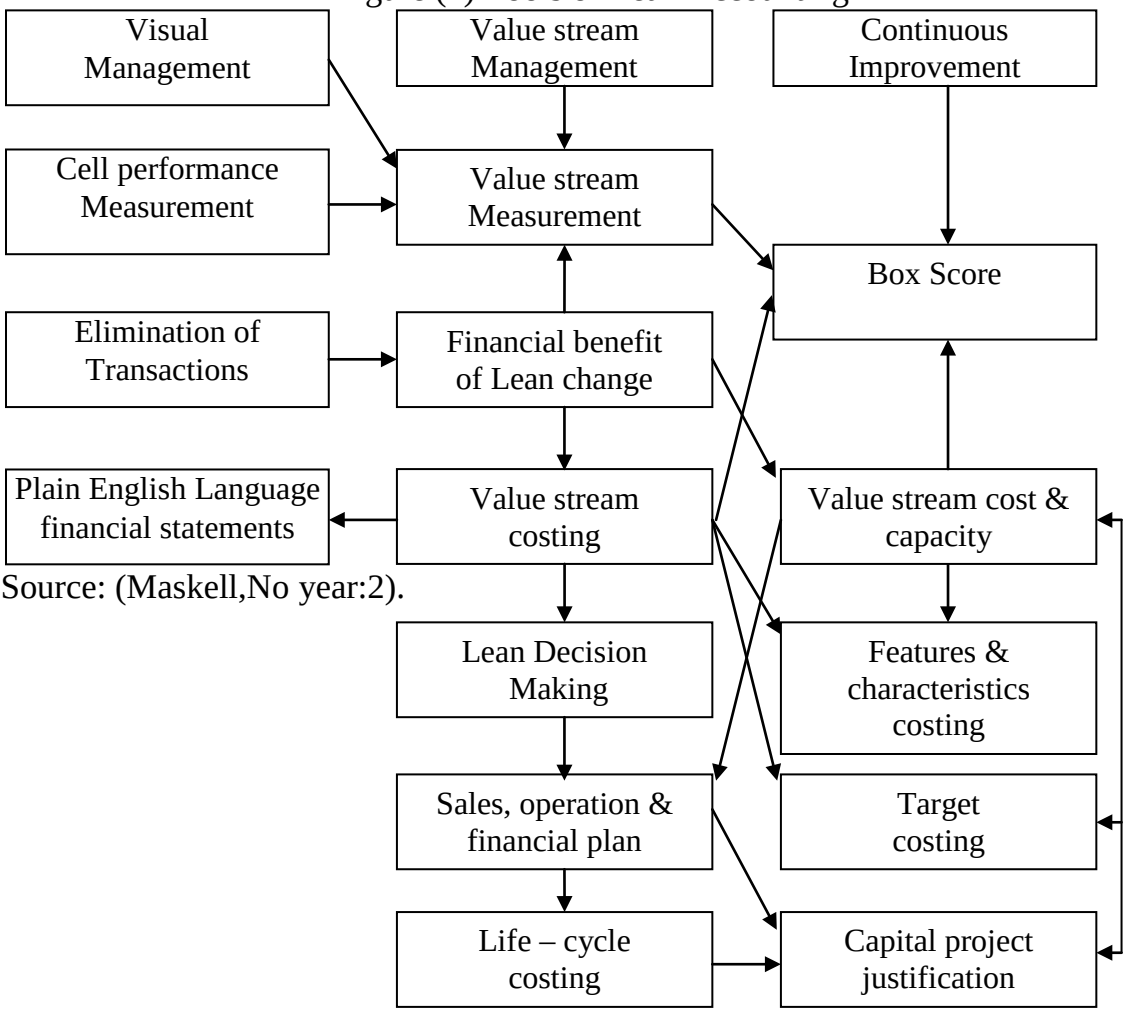
Source: (Maskell&Baggaley,2006:37).

(Stephen,2007:1)summarizes the principles of lean accounting in the following phrase:

"Lean accounting principles were originally developed in industrial operations as aset of tools and practices that managers and workers could use to eliminate waste and inefficiency from production systems ,reducing costs, improving quality and reliability, and speeding up cycle times".

(Maskell,2005:2) mentions that there are several tools of lean accounting and they each work together to create a framework for the control and management of a lean enterprise and he describesthesetools of lean accounting as shown in figure (2) below:

Figure (2) Tools of Lean Accounting



Source: (Maskell,No year:2).

It is shown from figure(2) that the continuous improvement is implemented by the main tools of lean accounting:value stream costing and box score which represent the basic financial reports of lean accounting.

It is noted that value stream, Plain English Language and SOFPare considered principles of lean accounting by (Waddell), but these principles are considered tools of lean accounting by (Maskell&Baggaley).Anyway these principles, practice and tools have been implemented at a wide range of companies , they can be readily adjusted to meet the companies specific needs and they fully comply with generally accepted accounting principles and international accounting standards, so there is no change in accounting because lean accounting relates to internal reporting not external reporting.

Seventh: Advantage & Disadvantages of Lean Accounting:

(Maskell,No year:2-4) points out that There are several advantages and benefits of lean accounting:

1. Lean accounting increases sales because it provides better information for decision making. If standard cost information is used for decisions relatingto such things as pricing, quoting, profitability, make/ buy, product rationalization, capital investment, and new product introduction, this will make the wrong decision. Standard costs are just plain wrong when it comes to these kinds of decisions. Lean companies need better tools like value stream costing and lean decision. (Ahakchi etal,2012:4) mentions that standard costing and variance analysis are not only useless for lean production but also they do actively against lean method success.
2. Lean accounting clearly identifies the financial impact of lean improvement. Most companies use traditional cost-saving models to assess the benefit of lean improvement, and many companies look for short –term cost reductions as a result of lean changes.
3. Lean accounting saves money and reduces costs. Most companies have no idea what they cost because they are deeply embedded into the companies processes. As an organization matures with lean accounting they are able to systematically eliminate many transactions and reports. As the processes are brought undercontrol operationally it is possible to eliminate most of the traditional accounting and controlsystems and their required transactions.
4. Lean accounting methodology simplifies and streamlines of the accounting process without upsetting theGenerally Accepted Accounting PrincipleGAAP, by replacing, distortion, confusion and time – wasting parts of the process with metrics and analysis that is grounded in the language of the lean manufacturing processes: “the value stream flow process” that has already successfully implemented.(Warren,No year: 1)
5. Businesses adopt lean accounting to maximize its business, resulting in competitive and financial benefits (Ruffa, 2008:1).

However, (Vitez,No year:1-2) argues that there are several disadvantages of lean accounting:

1. Time consuming:

One disadvantage with lean accounting is the amount of time accountants must spend in building the information systems necessary to collect financial

information. Accountants may struggle when implementing lean accounting because this accounting tool creates a stronger focus on management accounting rather than financial accounting.

2. Increase information:

Lean accounting requires more information about the company's production processes, giving accountants a more thorough understanding of business operations. It also forces change by increasing the value added to consumer goods and services. Accountants must take this information and understand how it should be reported to executive management so business decisions can be made to improve the value added process and eliminate waste.

3. Fundamental accounting changes:

The biggest disadvantage of lean accounting is the fundamental change it creates in traditional accounting systems. Most accountants are educated in traditional costing method and may find the change to lean accounting difficult to implement.

Eighthly: Financial Reports for Lean Operations:

These include the following financial reports:

1. Value stream costing.
2. Box scorecard as a performance measure.

1.Value stream costing:

a.Value stream costing definition:

A value stream is defined as" all the activities required to bring a product or service from conception through to the customer, including related information processing, logistics, and the collection of money." (Merweetal,2007:29)

A value stream is also defined as" an end-to-end collection of activities that creates a result for a customer who may be the ultimate customer or an internal user of value stream, it has a clear goal: to satisfy the customer". (Brown, 2009:6).

(Rother& Shook,1999:9) define value stream as" all the action (both value added and non-value added) currently required to bring a product through the main flows essential to every product such as":

(1) The production flow from raw material into the arms of the customer.

(2) The design flow from concept to launch.

So it can be said that value stream is a cycle of activity that begins with specified events and ends when specified output is produced.

b.Value stream versus value chain:

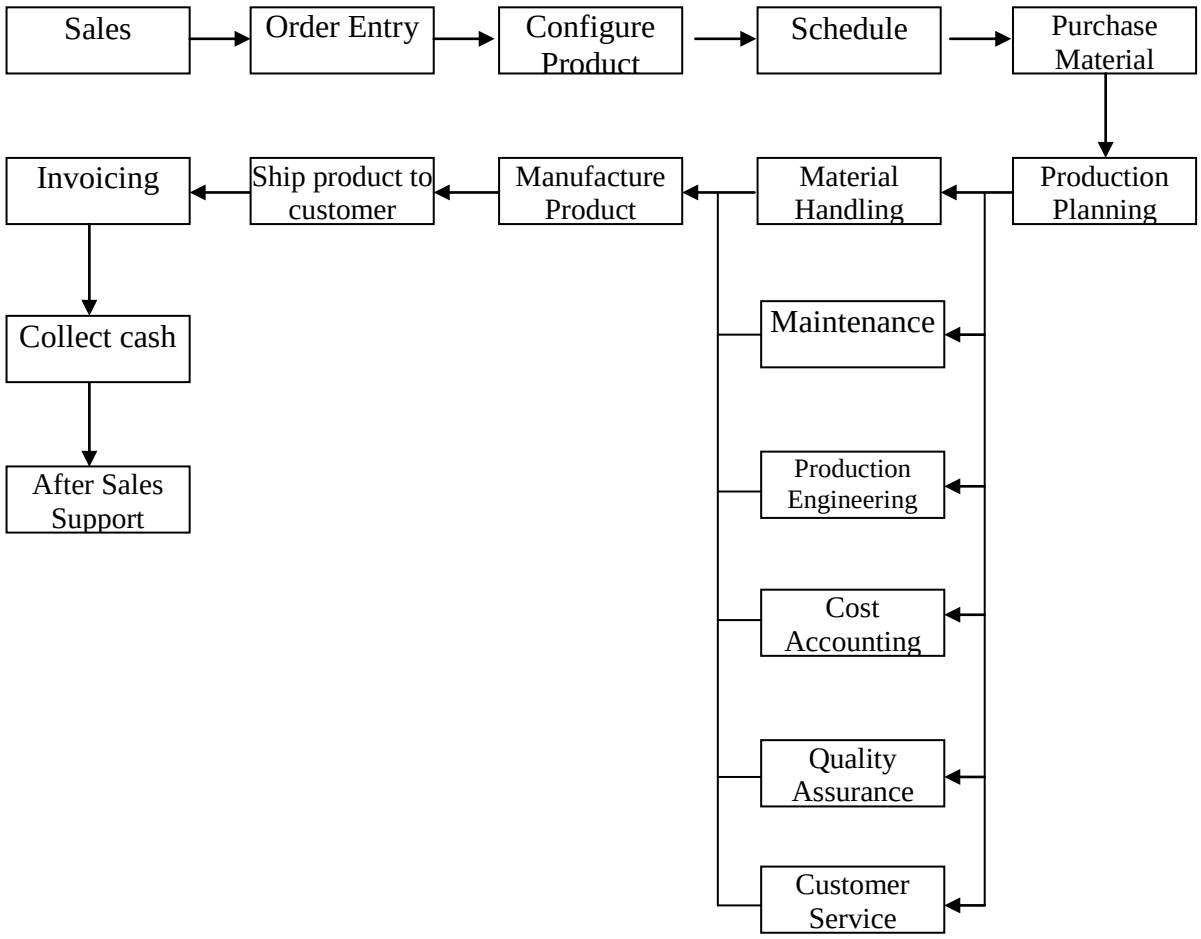
The value chain describes the set of functions that increases the value of an organizations products or services. The value added activities that the firm provides are those that customers perceive as adding utility to the goods or services purchased. The value chain comprises functions from research and development through the production process to customer service, these functions include the following processes: (Maher, etal, 2006: 3).

(1) Research and development: the creation and development of ideas related to new products, services or processes.
(2) Design: the detailed development and engineering of products, services, or processes.
(3) Production: the collection and assembly of resources to produce aproduct or deliver a service.
(4) Marketing: the process that informs potential customers about the attributes of products or services and lead to the sale.
(5) Distribution: the process established to deliver products or services to customers.
(6) Customer services: the support activities provided to customers concerning a product or service.

According to (Brown,2009:7) the value chain perspective is driven by a functional business view, evaluating,cost and margins as a basis for competitive comparison.

Figure (3)describes the typical order fulfillment of the value stream .

Figure (3)
Typical order fulfillment value stream



Source (Baggaley&Maskell, 2003:24)

Value is added through many different processes rather than by one specific process such as production.So where a customer places an order, value is added from taking the order,manufacturing products, shipping products, collecting cash and after sales services. The chain of these processes would become a value stream for sales. Alean company recognizes the connection along the entire stream of the work performed in order to achieve a smooth flow of the product to satisfy customers, or to create value for them. (Baggaley&Maskell 2003:1)

From the previous opinions it can be concluded that the concept of value stream differs from that of value chain.A value stream is much simpler than value chain, the value chain relates to the organization as a whole and each function from the research and development to customer service adds value to the product or service .But value stream relates to a set of activities that satisfy a particular type of customer.

c.Value Stream Mapping:

(Rother&Shook,2003:8) define value stream mapping as "a lean manufacturing technique used to analyze and design the flow of materials and information required to bring a product or service to a consumer".

(Wiinberg, 2010:5) mentions that value stream mapping is the language of lean, making it possible to find suitable area for lean improvements and determine their potential, therefore mapping the value identifies both value adding and wasteful activities, making it possible to build a complete value stream according to the lean principles and procedures.

Value stream mapping aims to identify process improvements by graphically mapping out the process, with blocks representing physical steps in the process and arrows showing flows of information. It is used for production or service creation processes, and depicts how value is created and added.For example value stream maps emphasize the physical flow of material.It can be used in a distribution operation, a service business such as a theme park to physically map out how transactions, products, or customers flow through the system. (Beckman &Rosenfield, 2008: 370).

d.Importance of Value Stream Mapping:

(Rother&Shook,1999:11),(Magnier,2003:2) argue that value stream mapping is important because of the followings:

(1) During the team creation of a value stream mapping, business and manufacturing waste that occur in the process can be easily identified.
(2) Once the current state value stream mapping is created, it becomes the base line for improvement and for the creation of a future state value stream mapping.
(3) It helps to visualize more than just the single-process level, i.e. assembly, welding in production, so the flow can be seen.
(4) It helps to see more than waste, mapping helps to see the sources of waste in the value stream.

(5) It provides a common language for talking about manufacturing processes.
(6) It makes decisions about the flow apparent, so they can bediscussed, otherwise. many details and decisions on shop floor happen by default.
(7) It ties together lean concepts and techniques, which help to avoid "cherry picking".
(8) It forms the basis of an implementation plan. By helping to design how the whole door-to-door flow should operate a missing piece in so many lean efforts.
(9) It shows the linkage between the information flow and the material flow – No other tool does this.
(10) It is much more useful than quantitative tools and layout diagrams that produce a tally of non-value – added steps, lead time, the amount of inventory.

e. Value Stream Mapping Steps:

(Nielsen,2008:2-20) and (Bolesta,No year:13) point out that Steps of value stream mapping are as follow:

(1) Current State Map:

The process for current state value stream mapping has six steps:

(a) Select the product family:

Value stream maps are created for a single product, or a family of products. A family is a group of products with similar routings, similar process times and customers with similar needs and demand rate.

(b) Decide what the goal for improvement:

Improvement goal is essential to avoid an open-ended mapping process, without a goal. "Paralysis by analysis" is the most likely outcome that being said. There are different opinions about what the goal should be.

(c) Form the Value Stream Mapping Team

Value stream mapping is best done by a team, this is because few people really understand the entire value stream or have the knowledge to anticipate the impacts of specific changes to it. The following people are useful to include in a team:

- Supervisors and other shop floor leaders.
- A representative from the IT department.
- Someone from engineers who sets up routings for products.
- Operators.
- Machine programmer.
- The operations manager.
- Representatives from sales, design and purchasing.
- Management accountant.

(State of Maine, 2006:3) mentions that the team has many tasks to do, each value stream team will:

-develop a shared understanding of the current state process.

-create a shared future state process.

-develop an implementation plan that the team will commit to carry out together.

-build a team and organizational culture of continuous improvement

(d) Walk the Flow:

It is time for the team to go to the shop floor where the product is made. The team members should have a form for gathering data on each step including (work centers, queues, raw materials arrival, shipping to the customer and operators).

(e) Understand customer value and scheduling:

The key to lean is to understand the product or service from the perspective of the customer. Value stream maps are drawn to reduce waste and improve the rate of flow so that production can be done in the most cost-effective manner, but ultimately: the goal is for the customer to receive the right goals at the right time and at the right price.

(f) Draw the current state map:

The current state map is simply a set of connected operations and queues, starting with a supplier and ending with a customer. The group should ignore and process flow charts already in existence, and rely solely on the data gathered during the walk through the process.

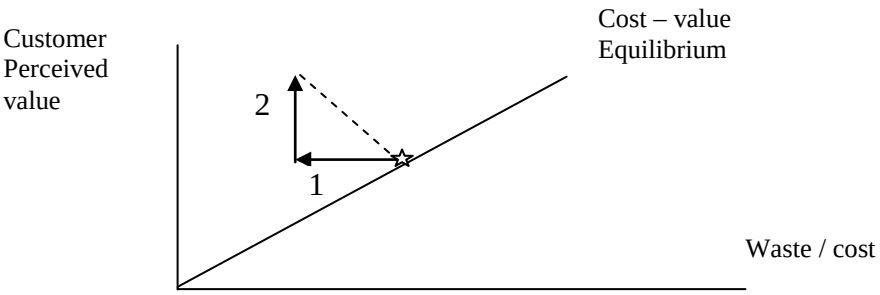
(2)Waste Elimination: constructing target state maps

Value stream mapping is designed to reduce lead time, make product flow and to eliminate waste (non- value added operations or activities) all for the purpose of meeting customer demand at the lowest cost, with the highest quality. Lean relies on recognizing the seven waste: (over production, over processing, inventory, motion, scrap, waiting and transportation). Target maps reveal which of these wastes can be eliminated now and where it is easy to avoid. The traditional problem of eliminating waste at an operation is where there is no net gain, because the revised system's performance can be compared to the current state, to see the impact of the proposed change.

The key to producing useful target maps is to look for low cost improvements that encourage flow, reduce inventory and test the organization ability to manage in a lean environment.

(Hines,2005:7) describes the relationship of value, cost and waste as in figure (4):

Figure (4)
Relationship of value cost & waste



Source: (Hiens, 2005: 7)

The figure above explains that creating lean solution is achieved by:

(a)Reduce internal waste (as shown in the arrow 1)

(b)Develop customer value (as shown in the arrow 2)

(3) Draw the Future State Map:

In order to draw the future state map we must take the following questions intoaccount: (Bolesta,No year:15)

(a) What does the customer really need?

(b) How often will we check our performance to customer needs?

(c) Which steps create value and which are waste?

(d) How can we flow work with fewer interruptions?

(e) How do we control work between interruptions? How will work be prioritized?

(f) Is there an opportunity to balance the work load and / or different activities?

(g) What process improvements will be necessary?

According to (Nielsen,2008:20), the future state map is achieved by (pull) system, that may extend all the way to the customer, so that the customer issues cards or containers that serve to authorize production, but somewhere there is need to take a forecast or a set of customer orders, and decide how to schedule the required work.

(Gidley,2004:10) mentions that mapping the future state requires more arts, engineering and strategy than present state, and also needs background knowledge in the following:

(a) Takt time:

- It's average time between production units necessary to meet customer demand.
- It divides available time by required number of units.
- Get to the beat of the factory.

(b) Identify bottleneck processes:

- The operation with the longest cycle time.
- Total system output.
- Becomes the primary scheduling point.

(c) Identify lot sizing / setup opportunities.
(d) Identify potential work cells.

2. Box scorecard as a performance Measure:

The lean control system uses a Box scorecard that compares operational, capacity, and financial matrices with prior week performances and with a future desired state. Trends over time and the expectation of achieving some desired state in the near future are the means used to motivate constant performance improvement. Thus the lean control approach uses a mixture of financial and nonfinancial measures for the value stream. The future desired state reflects targets for the various measures. Operational, nonfinancial measures are also used at the cell level. A typical value stream Box scorecard is shown in table(3). (Hansen et al, 2009: 575).

Table (3)
Value stream Box Scorecard

Measures	Last week	This week	Planned future state
Operational units per person	Xx	Xx	Xx
On-time delivery	Xx	Xx	Xx
Dock-to-Dock days	Xx	Xx	Xx
First time through	Xx	Xx	Xx
Average product cost	Xx	Xx	Xx
Accounts receivable days	Xx	Xx	Xx
Capacity: Productive	Xx	Xx	Xx
Non productive	Xx	Xx	Xx
Available	Xx	Xx	Xx
Financial: Weekly sales	Xx	Xx	Xx
Weekly material cost	Xx	Xx	Xx
Weekly conversion cost*	Xx	Xx	Xx
Weekly value stream profit	Xx	Xx	Xx
ROS (Return on sales)%	Xx	Xx	Xx

Source / (Hansen *et al*, 2009: 576)
*Conversion costs are made up of employee costs and machine costs.

Regarding table (3)(Hansen etal,2009:577) mentions that average costing,value stream cost reporting and the heavy use of nonfinancial measures for operational control are typical lean accounting approaches. The average product cost is the total value stream cost of period divided by the units shipped of the period. Value stream costing reports the actual revenues and actual costs on a weekly basis .The lean control system uses a box scorecard that compares operational, capacity and financial metrics with prior week performance and with a future desired state.

At the end of this sectionit can be said that lean accounting is simpler than traditional costing because lean accounting is based on simple and timely reports, also calculates actual costs for the products by using value stream costing without the need for overhead cost allocation . So lean accounting eliminates the idea of standard costing, because it is a complex system based on calculating variances and it supports the traditional costing system,so it is inconsistent with customer and employee focused lean cultural value.

Section Two
The Practical Aspect

Proem:

This sectionreviews the historical concise ofAl-Hayat soft drinks & Mineral Water Company, the research sample. The study concentrated on the products: Pepsi, Miranda, 7 up and Mountain Dew. Thissection also displays each of the traditional (current) manufacturing process layouts for the company and proposed manufacturing process according to value stream that reduces waiting time and total batch time. Furthermore, it includes the study of current, required and excess number of employees working in manufacturing processes on value stream flow and involves preparing income statement for the sample company according to standard costing and according to value stream costing, with the comparison between the two income statements. Finally,this section focuses on preparing value stream box scorecard, one of the important reports used in lean accounting.

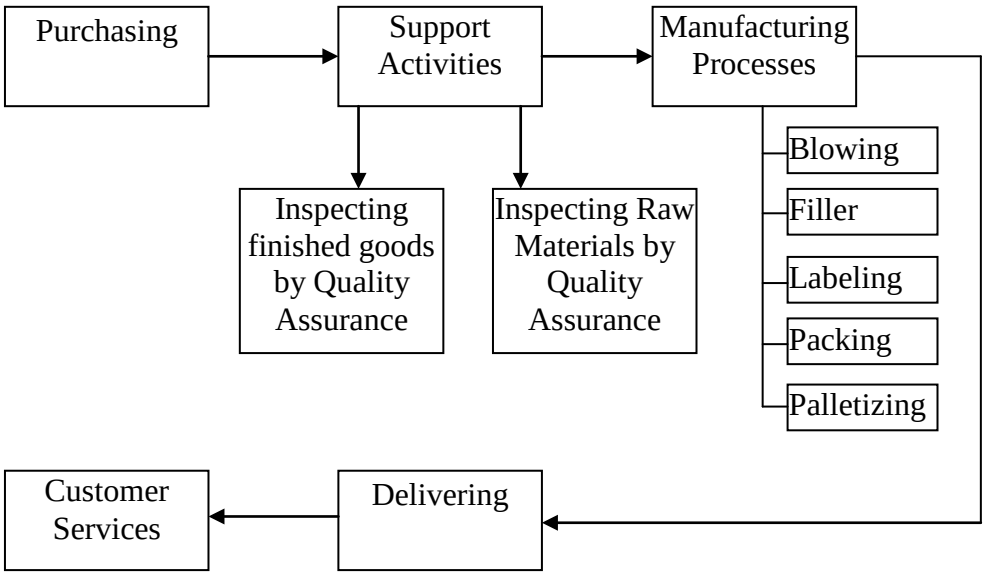
Firstly: the Historical concise of AL-Hayat soft Drinks & Mineral water Company:

AL-Hayat soft drinks & Mineral water company is a private company established in 5/1/2006, working with franchise from the international Pepsi-cola company in America. The marketing of its products within the assigned geographical area: Erbil, Sulaimani, Duhok, Kirkuk and Nineveh. The company produces (55) types of soft drinks and Mineral water.

Secondly: Value Stream Mapping in AL-HayatCompany:

The value stream of the company for the three products (Pepsi, Miranda, 7up and Mountain Dew) can be represented as it is clear in figure (5).

Figure (5)
Value Stream Mapping of AL-HayatCompany



Source: prepared by the researcher depending on Appendix (1)and other data.

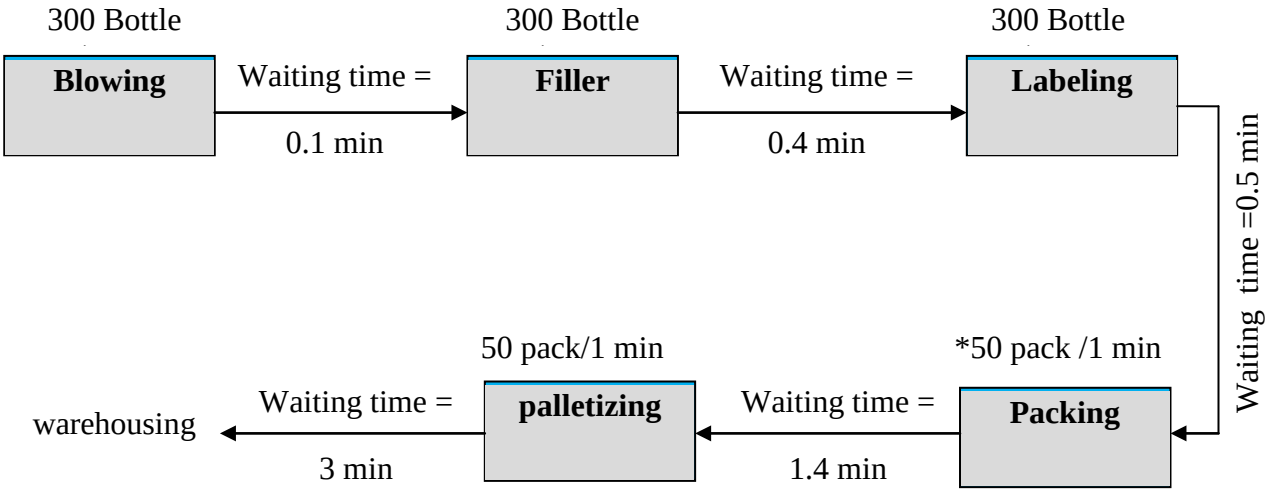
It is clear from the above that the value stream of the company starts from purchasing activity, this activity is performed by the supply chain manager in the company, then the materials will be inspected by Quality Assurance department (as a support activity) according to International Standards of raw materials. Then the value stream passes through the manufacturing stages: (blowing,filler, labeling, packing ,palletizing) ,Delivering and finally the company offers services to the customers such as:

1. Reducing the product price
2. Promotion for the product for example (cars, collect and win a bottle, 5 minute korektel free)
3. Giving tables, chairs or umbrellas to the customers as gifts with the products.

Thirdly: Current Manufacturing Process Layout in AL-Hayat Company:

In traditional manufacturing processes for the products Pepsi, Miranda, 7up and mountain Dew, production is organized in to departments and products are produced in large batches. It requires waiting time as each batch moves from one process to another so waiting time are sources of waste. Figure (6) represents current manufacturing Layout of the products.

Figure (6)
Current Manufacturing Layout in AL-Hayat Company



Source: prepared by the researcher depending on the company plant data and appendix (1)
*Each process produces50 packs = 300 bottles (each pack = 6 bottles)
Min = minute
Blue colored blocks = value added processes
Waiting time =non value-added processes

As can be seen in figure (6) each process takes (1 min), and there is waiting time between each two processes until the finished goods reach the warehouse.

According to the (Daily production run report), as shown in the Appendix (2) of the research, the daily net production of the company is about (12,918 packs), so the calculation of the process time will be as in the table (4):

Table (4)
Process Time

Processes	Time
Blowing	[1]*258(50 packs) x 1 min = 258 min
Filler	258 (50 packs) x 1 min = 258 min
Labeling	258 (50 packs) x 1 min = 258 min
Packing	258(50 packs) x 1 min = 258 min
Palletizing	258(50 packs) x 1 min = 258 min
Total processing time	1290 min
Waiting time	258(50 packs)X [2*]5.4 min = 1393.2 min
Total Batch time	2,683.2 min

Source / prepared by the researcher depending on the figure (5) and Appendix (2)

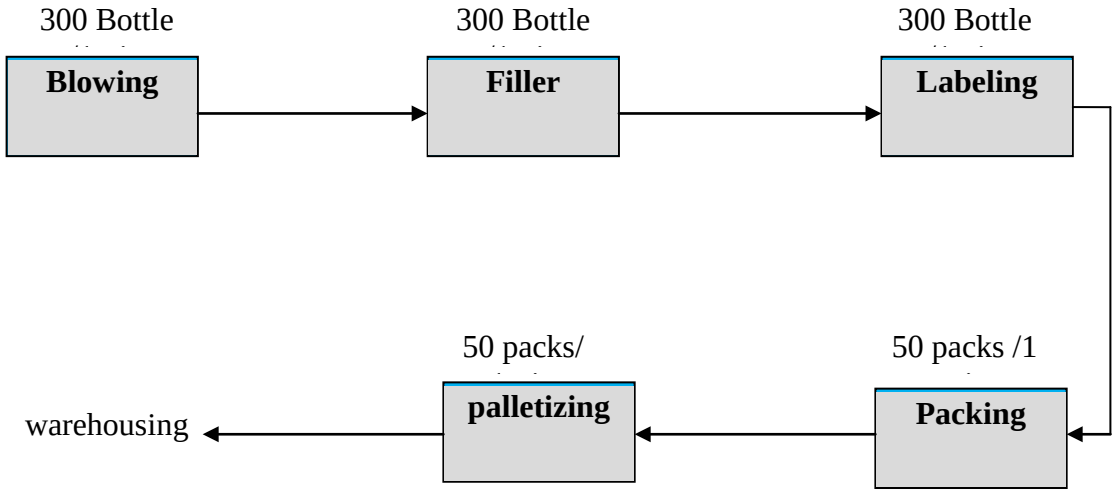
1* $\frac{12{,}918 \text{ pack}}{50 \text{ pack}} \approx 258$ (50 pack)

2* waiting time= (0.1min+0.4min+3min+1.4min+0.5min) =5.4 min

Fourthly: Proposed Manufacturing Processes According to Value stream

Figure (7) shows the proposed manufacturing processes according to value stream.

Figure (7)
Proposed Manufacturing Process



Source: prepared by the researcher

According to value stream, If the processing is done continuously without waiting time between each two processes, then we suppose that a (50 packs) is

produced every 5 minutes after the first (50 packs) is completed, as it is shown in the table (5).

Table (5)
Processing Time According to Value Stream

Processing Time for 258(50 packs)	Elapsed Time
- First (50 packs)	5 min (1 + 1+1+1+1min)
- Second (50 packs)	5 min + 5 min =10 min [processing begins 5min after the first (50 packs)]
- Third (50 packs)	10 min +5 min = 15 min
- 258^{th} (50 pack)	1,085 min + 5min = 1,090 minTotal Processing time

Source: prepared by the researcher

Table (5) shows that each (50 packs) needs 5 minutes to be completed, so the first (50 packs) needs only 5 minutes, the second (50 packs) needs 10 minutes (5min+5min) becauseprocessing begins 5minutes after the first (50 packs) , the third (50 packs) needs 15 minutes (10min +5min) and so on, the last 258^{th} (50 packs) needs 1090 minutes (1085min+5 min), thus total processing time to produce 258(50 packs) or 12918 packs is 1090 minutes. Time saved over traditional manufacturing is calculated as the following equation:

Time saved over traditional manufacturing = Total Batch time - Elapsed time according to value stream

Time saved = 2,683.2 min – 1,090 min

Time saved = 1,593.2 min

The elapsed time for proposed manufacturing process as shown in table (5) is 1,090 minutes ,so the production rate is calculated as 1,090 minutes divided by the cycle time (number of minutes it takes an operation to process every 50 packs of the product= 1minute). The production rate shows how many (50 packs)of the product can be produced by each manufacturing process in 1,090 minutes, it is calculated as follows: Production rate=1,090 min/ 1min = 1,090(50 packs) can be produced in 1,090 minutes, it means that 54500 packs or 1090(50 packs) can be produced instead of 12918 packs or 258(50 packs)in 1090 minutes. This calculation is based on the assumption that the manufacturing process is operating continuously without waiting time.

Fifthly: Current & Required Number of Workers:

The required number of workers according to value stream can be calculated as follows:

$$\text{Required number of workers according to V.S} = \frac{\text{Required time (minutes) x daily production run}}{\text{Daily Available Time (minutes)}}$$

$$= \frac{*5 \text{ min x } 258 \text{ times}}{5 \text{ hours x } 60 \text{ min}} \approx 5 \text{ employees}$$

*[1 min for each process as s

Table (6) explains the manufacturing processes in comparison with the required number according to the equation above. It seems that there ar edundant.

Table (6)
Current, Required &redundant number of employees in the manufacturing processes

Process	Current number of employees
Blowing	(4) employees (2 operators + 2 workers)
Filler	(2) employees
Labeling	(2) employees (1 operator + 1 worker)
Packing	(2) employees (1 operator + 1 worker)
Palletizing	(2) employees (1 operator + 1 worker)
Total	(12) employees
Required number of employees	(5) employees
Redundant number of employees	(7) employees

Source: prepared bythe researcher depending on the company data and plant engineers.

Sixthly: AL-Hayat company value stream costs:

Table (7) indicates the actual production cost for January -2013.

Table (7) AL-HayatCompany cost of production during January/ 2013

	Types	Total production (Pack) 1	The cost of raw materials/ one pack ($/pack) 2	Total cost of raw material ($) 3(1x2)	Depreciation/ one pack ($/pack) 4	Total Dep. ($) 5(1x4)	Damage & other expenses/ one pack ($/pack) 6	Total other expenses ($) 7(1x6)
150 ML	Pepsi	0	$0.000	0	0.376	0	0.465	0
	Mirinda Apple	15,048	3.887	58,491.576	0.376	5,658.048	0.465	6,997.32
	Mountain Dew	17,430	$3.919	68,308.17	0.376	6,553.68	0.465	8,,104.95
250 ML	Pepsi	83,758	$4.390	367,697.62	0.376	31,493.008	0.465	38,947.47
	Mirinda Orange	52,159	$4.58	238,888.22	0.376	19,611.784	0.465	24,253.935
	7UP	54,003	$4.41	238,153.23	0.376	20,305.128	0.465	25,111.935
	Diet 7UP	5,346	$4.27	22,827.42	0.376	22,827.42	0.465	2,485.89
	Mountain Dew	21,536	$4.56	98,204.16	0.376	98,204.16	0.465	10,014.24
1.75 LT	Pepsi	39,969	$2.63	105,118.47	0.376	105,118.47	0.465	18,585.585
	Mirinda Orange	18,367	$2.90	53,264.3	0.376	53,264.3	0.465	8,540.655
	7UP	10,493	$2.66	27,911.38	0.376	27,911.38	0.465	4,879.245
750. ML	Pepsi	46,892	$2.82	132,235.44	0.376	132,235.44	0.465	21,804.78
	Mirinda Orange	12,309	$3.05	37,542.45	0.376	37,542.45	0.465	5,723.685
	Mountain Dew	18,055	3.139	56,674.645	0.376	56,674.645	0.465	8,395.575
Total				1,505,317.081		617,399.913		183,844.725

Source: prepared by the researcher depending on the company data.

Table (8) shows the value stream cost of the company for January.

Table (8)
AL-Hayat company value stream costs for January according to figure (4) ($).

	[1]* Material	[5]* Salaries	[2]* Machining	[3]* other	Total cost
Production planning		4,000			4,000.000
Purchasing		3,850			3,850.000
Quality Assurance		4,500			4,500.000
Blowing	526,860.985	[4]* 700	216,090	64,345.75	807,296.735
Filler	301,063.420	700	123,480	36,769.00	461,312.420
Labeling	225,797.565	700	92,610	27,576.75	345,984.315
Packing	225,797.565	600	92,610	27,576.75	345,984.315
Palletizing	225,797.565	680	92,610	27,576.75	345,984.315
Quality assurance		4,500			4500.000
Warehousing		4,500			4500.000
Delivering		3,500			3500.000
Total	1,505,317.100	28,230	617,400	183,845.00	2,334,792.1

Source: prepared by the Researcher depending on table (7) and the company data

(1*, 2*, 3*) the cost of Raw material, Machining and other costs are distributed as (35%, 20%, 15%, 15%, 15%) according to the interview with plant engineers.

For example the total cost of material is distributed as follows:

1505317.1x35%= $526860.985

1505317.1 x20% = $ 301,063,420

1505317.1 x15% = $222,797.565

1505317.1 x15%= $ 222,797.565

1505317.1 x15%= $ 222,797.565

4* According to table (6), the required number of employees, 5 employees (1 employee in one process)

5* Depending on salaries statement at the company.

Referring to material costs in table(8) $1505317.1 is used in the manufacturing processes on the value stream for January, this amount is distributed on the

manufacturing processes:blowing, filler, labeling, packing and palletizing according to the percentages above. Salaries include amounts paid to the employees working on the value stream flow,so the labor costs of the employees is directly assigned to the value stream. Machining costs include machine depreciation cost and maintenance costs distributed on the manufacturing processes as the same percentages above .Other costs include damage costs and other expenses are distributed by the same way.

Seventhly: Current Income Statement for AL-Hayat Company:

Table (9) shows the (current) traditional income statement for the company according to standard costing for January-2013.

Table (9)
Current income statement for AL-Hayat Company for January-2013

	Amounts ($)	Amounts($)
Cash sales	2,497,126.000	
Credit sales	1,047,495.000	
Sales discount	(11,038.000)	
Free Goods	(20,787.000)	
Net sales		3,512,796.000
-Cost of good sold:		
Beginning inventory	2,468,347.000	
+ production cost(at standard cost)	2,379,051.100	
-Ending inventory	(2,106,549.000)	
Cost of good sold		(2,740,849.100)
Variances:		
+Material variance(debit)	10,555.000	
-Labor variance (credit)	(3,500.000)	
-Factory overhead variance (credit)	(513,14.000)	
Adjusted cost of good sold		2,696,590.100
Gross Margin		816,205.900
General & Administrative Expenses (G & A)	(68,439.000)	
Research & Development Expenses (R&D)	(161,118.000)	
Financial Expenses	(156,035.000)	
Depreciation	(186,824.000)	
Total other expenses		(572,416.000)
Operating income		243,789.900

Source: prepared by the researcher depending on the Table (8),Appendix (4)and other data.

It is clear from table(9) that the traditional income statement for Al-Hayat company is prepared according to standard costing and variance figures as its

shown in the table and the amount of operating income for the sample company is$ 243,789.9.

Eighthly: AL-Hayat Company Value stream Reporting:

After preparing the current income statement for the company that includes the traditional approach to compute operating income, the income statement will be prepared according to value stream with using the same data as it is shown in Table (10)

Table (10)
Income Statement according to Value steams ($)

	Manufacturing process stream	Sustaining cost	Total amounts
Revenues	3,512,796.000		3,512,796.000
Material costs	150,531,701.000		(1,505,317.100)
Conversion cost	[1]* 829,475.000		(829,475.000)
Value stream profit			1,178,003.900
Value stream [2]*(ROS)			33.53%
Other operating expenses		(572,416)	(572,416)
Change in inventory			(361,798)
Plant gross profit			243,789.9
Plant (ROS)			6.94%

Source: prepared by the researcher depending on table (8), (9)

1* Conversion costs include: (Salaries, Machining, other)

2* ROS: Return On Sales.

It is observed from table (10) that:

1. All actual costs,(direct or indirect)are allocated on the value stream not on the product.
2. Value stream income statement is easy to understand by all employees.
3. Value stream income statement is easy to use because it doesn't include misleading and complex data like standard costs and variance figures that are used in the traditional systems.
4. Value stream income statement includes material costs and conversion cost (labor costs and factory overhead costs). Value stream profit is the result of deducting conversion cost from revenues.
5. The effect of the decision on the profitability of the value stream may be the important information needed for certain decision,as special order or make-or- buy decision,so value stream profit and value stream ROS are considered useful indexes in making such decisions.

6. The traditional income statement takes in to account thebeginning and ending inventory to compute cost of good sold, but value stream income statement uses the term, change in inventory, as one of the expenses deducted from value stream profit to reach the plant gross profit.

Ninthly: Value Stream Box Score Card for AL-Hayat Company

A value stream box score card for the sample company for January is shownin table (11):

Table (11)
AL-HayatCompany value stream box score card for January

	Last month	This month (January) (current state)	Planned future state
Operational:			
Pack per person	1,077 pack	2,584	2,584
Dock-to-dock day	12 days	12	11
First time through	95%	95%	97%
Capacity:			
Productive	72.5%	71.8548%	72%
Non productive	1 %	1.1452%	0.5%
Available	26.5%	27%	27.5%
Financial:			
Monthly sales	$2,823,897.000	3,512,796.000	4,000,000.000
Monthly material cost	1,505,317.100	1,505,317.100	1,505,317.100
Monthly conversion cost	829,475.000	829,475.000	829,475.000
Monthly value stream Profit	489,104.900	1,178,003.900	1,665,207.900
ROS%	17.32%	33.53%	41.63%

Source: prepared by the researcher depending on previous tables, Appendix (3) and interview plant engineers.

The figures in table (11) regarding currentstate are calculated as follows:

1. Pack per person = $\frac{\text{production quantity}}{\text{Number of employees}}$

$= \frac{12{,}918 \text{ packs}}{5 \text{ employees}} = 2{,}584 \text{ packs per person}$

2. Dock-to Dock days: is the time it takes for a product to be manufactured
3. from the moment the materials arrive until the finished goodsare delivered.

[1 day (manufacturing) + 2 days (inspecting by Quality Assurance)]x 4 weeks

4. First time through: is the percentage of good production (without being defective)
5. Capacity:

Referring to Appendix (3) that shows pet line brief production of the sample company:

Gross production / Gross production theory = 67,934 / 93,594 = 73% utilized capacity

Pack loss + production breakage= nonproductive capacity

1.131% + 0.0142% = 1.1452% non-productive capacity

73% - 1.1452% = 71.8548 % productive capacity

100% - 73% = 27 % available capacity

Table (11) shows that Dock-to-Dock day is targeted to go from 12 days to 11 days, it means that the company tries to reduce this time in the future. Also, it is clear that the company aims to increase its quality percentage to 97%. Capacity measurement is named as productive (value added), nonproductive (non- value added –used but wasteful) and available (unused capacity).The productive capacity is aimed to increase to be 72%, but the nonproductive capacity is targeted to be 0.5% in the future state, and the available capacity increasing from 27% to 27.5%. This means that when waste is decreased the nonproductive capacity will convert into available capacity, so all the resources used in wasteful activities can be now used for productive activities like adding new product line. Regarding financial measurement it is clear that the sample company improves its monthly sales to be $ 4000,000 in the planned future state, hence the monthly value stream profit is aimed to increase about $487204 or 8.1%.

Tenthly: Results of theResearch

The following are the main results of the practical aspect of the research:

1. It is indicated that the total processing time in AL-Hayat Company is (1,290) minutes to produce 12,918 packs and total batch time is(2683.2) minutesas shown in table (4).
2. After calculating the processing time in the sample company according to value stream it is appeared that the total elapsed time to produce 12,918 packs or 258 (50 pack) is (1,090) minutes, therefore the time saved over traditional manufacturing is (1,593.2) minutes.
3. The required number of employees in manufacturing processes according to value stream is (5) employees, but the current number is (12) employees, so the redundant number of employees is (7) employees as shown in table (6).
4. The value stream profit before deducting change in inventory and other expenses in AL-Hayat Company amounted to($ 1178,003.9), and the value stream return on sales is33.53% according to table (10).
5. The value stream box score card prepared for AL-Hayat Company includes operational, capacity and financial measures as shown in table (11).

6. Regarding value stream Box score card, Dock-to-Dock day is targeted to go from 12 days to 11 days, so the company tries to reduce this time in the future. The company also aims to increase its quality percentage to 97%. The productive capacity is aimed to increase to 72%, but nonproductive capacity decrease to 0.5%, and the available capacity is planned to increase to 27.5%. Furthermore, the financial measure indicates that the company aims to increase sales to $4000000 in the future state and the value stream profit increases by ($487204) or at a percentage of 8.1%.
7. Depending on the previous results it can be concluded that lean accounting tools do simplify operations, modify financial reports to include non-financial information besides financial information, and reduce the operation elapsed time and the demand employees. So the alternative hypothesis H1 of the research is accepted and the hypothesis H0 is refused.

Section Three
Conclusions & Recommendations

Firstly: Conclusions

The research attained several conclusions are as follows:

Theoretical conclusions:

1. Lean manufacturing process aims to minimize waste in time and resources and maximize value through continuous improvement together withflowing the product at the pull of the customer in pursuit of perfection.
2. Lean accounting principles reflect the financial performance of a company that has implemented lean manufacturing process.
3. Standard costing, absorption costing, activity based costing and other traditional cost accounting do not fit in with a lean accounting system because of the complexity in accounting processes and a high cost incurred.
4. Value stream reporting is a major tool used in lean accounting system. The income statement should reflect the profit or loss by value stream.
5. All costs should directly be allocated on value stream not on products, so lean accounting is much simpler than traditional product costing because calculating product cost by value stream requires less overhead allocation.
6. Box scorecard is an important report used in lean accounting system. Continuous improvements of the value stream are reported according to a number of physical measurement .These improvement will affect financial figures in apositive way.

Practical Conclusions:

According to the research results some important conclusions can be derived, these are as follows:

1. Based on computing the production rate (as shown in page 30) this conclusion can be derived:

The production rate shows how many (50 packs) of the product can be produced in 1,090 minutes through the manufacturing process, so the production rate is calculated as 1,090 minutes divided by the cycle time (1minute) = 1,090 (50 packs) can be produced in 1,090 minutes, it means that 54500 packs or 1090(50 packs) can be produced instead of 12918 packs or 258(50 packs) in 1090 minutes. This calculation is based on the assumption that the manufacturing process is operating continuously without waiting time.

2. Time saved over traditional manufacturing by using lean accounting in comparison with traditional manufacturing process is 1,593.2 minutes(2683.2 min-1090 min),so the company can use this available time to produce 318.64(50 packs)or 1,593.2minutes/ 5 minutes (1min+1+1+1+1).Just as stated in the third hypothesis of the alternative hypothesis H1.
3. The redundant number of employees in the manufacturing process is 7 employees, the average salaries of the employees in the manufacturing process is $ 676 so the company can save $4,732($676 x7 employees), then we can deduce that implementing the value stream structure does not require an increase in the number of people needed but on the contrary it reduces the demand for people. Just as stated in the third hypothesis of the alternative hypothesis H1.
4. Actual value stream costs consist of material,salaries,machining and other costs,thus total value stream costs include total actual cost for packs produced .The average cost of value stream is calculated as total value stream cost for the period divided by packs sold, not packs produced, therefore, it motivates managers to reduce inventories.
5. When comparing traditional income statement and value stream income statement we notice the following:
   a. All actual costs direct or indirect are allocated on the value stream not on the products.
   b. Value stream income statement is easy to use by everyone because it doesn't include misleading and complex data as standard costing and variance figures. Just as stated in the first hypothesis of H1.
   c. Value stream income statement includes material costs and conversion costs. Value stream profit is the result of deducting these costs from revenues.
   d. The effect of the decision on the profitability of the value stream may be the important information needed for certain decisionas special order or make –or –buy decision , so value stream profit and value stream ROS are considered useful indexes in making such decision.

e. The traditional income statement takes in to account beginning and ending inventory to compute cost of goods sold. However, value stream income statement uses the term: change in inventory, as one of the expenses which are deducted from value stream profit to reach plant gross profit.

6. The value stream box scorecard of the sample company indicates the following:

a. Dock –to-Dock day for the sample company (the time it takes for a product to be manufactured from the moment the materials arrive until the finish goods are delivered and sold) is targeted to go from 12 days to 11days .So the company tries to reduce the time elapsed from material arrival until finished goods are sold.

b. The company aims to increase its quality percentage which is called (first time through) in the value stream box scorecard to be 97%.

c. Regarding capacity and financial measures, improvement impact should be seen in capacity and financial fields because some capacity may be freed up and used in another field. The capacity measures in the sample company are expected to improve over the time, the company purposes are to increase productive capacity to 72% in the future state and available capacity increasing from 27% to 27.5% because the company aims to eliminate wastes, and nonproductive capacity converts into available capacity used in another useful activities , this will affect the monthly sales to be improved in the future state ,then value stream ROS increases about 8.1%.

d. Financial and non-financial information in the box scorecard tell managers how well they doing and help them as planning ,control and future decision making tools about the whole activities (operational, capacity, financial) of the company. Just as stated in the second hypothesis of the alternative hypothesis H1.

Secondly:Recommendations

The main recommendations of the research are as follows:

2. Because of the severe competition among nowadays companies and themultiple customer requirements, the researcher generally recommends all companies including AL-Hayat Company to think about converting to lean manufacturing and lean accounting.
3. Conversions from traditional accounting to lean manufacturing and lean accounting requires publishing concepts of lean accounting among employees and educate them by organizing training courses about the modern techniques of managerial accounting and requirements to apply and implement lean manufacturing.

4. The sample company has to re-arrange the manufacturing processes for the purpose of achieving the optimum flow of operations by eliminating waiting time within processesthen reducing cycle time.
5. The sample company has to reconsider the number of employees working in manufacturing process. According to the interview with the plant engineers, each process can be managed by one worker so there are a redundant number of workers.
6. The sample company has totake advantageof preparing income statement according to value stream costing, being prepared on the basis of actual costing not standard costing, and many other advantages mentioned in conclusions.
7. The sample company has to take advantage of preparing box score card that contains information in three dimensions: operation measurement, capacity measurement and financial measurement , so the indexes in the box score card will be useful formanagement in making different decisions in the future.

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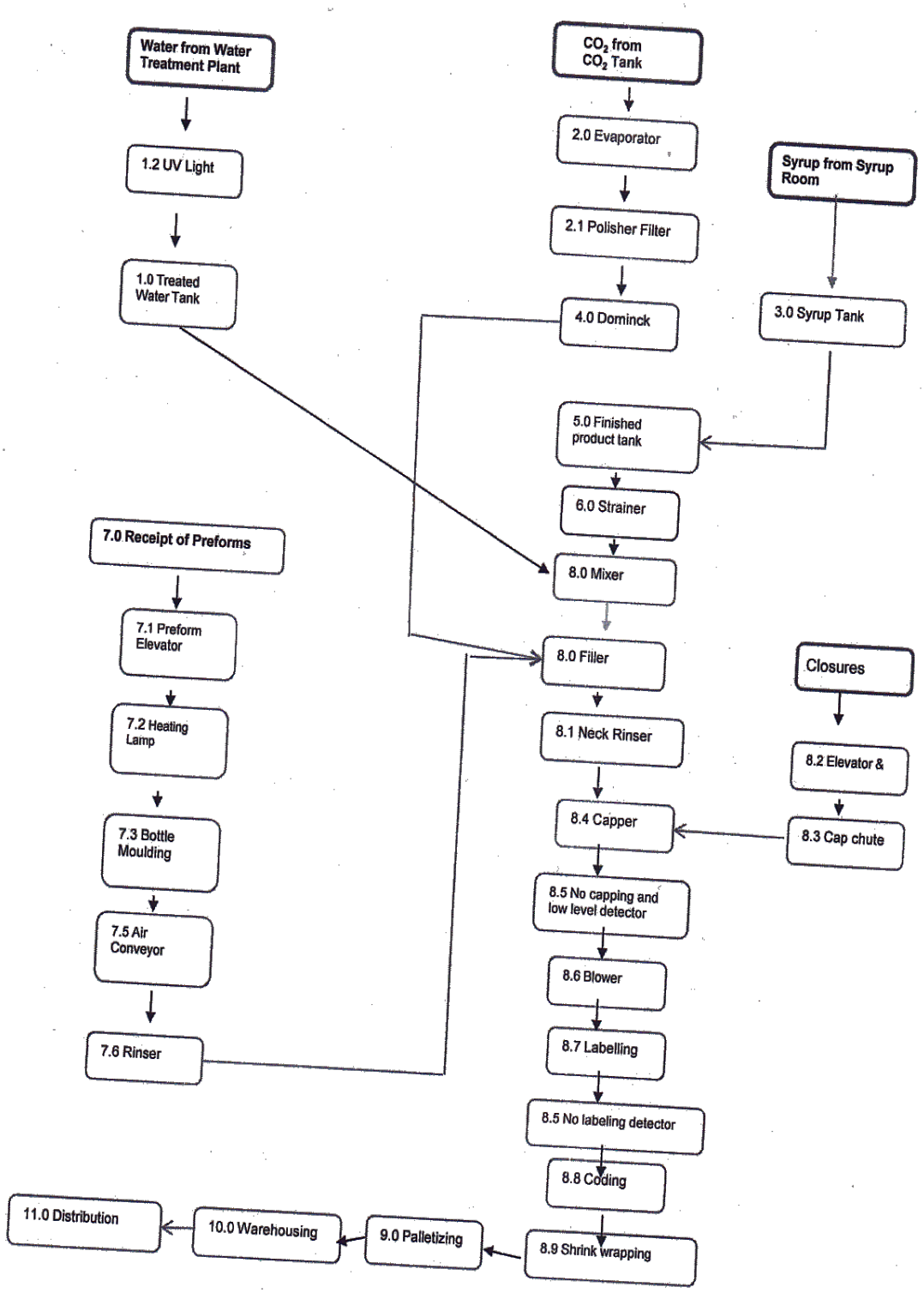
Appendix 1
Details of Manufacturing Processes Flow



Appendix 2

AL Hayat Soft Drinks & Mineral Water Co. — **Production Department**

DAILY PRODUCTION RUN REPORT

COUNTERS	
FILLER COUNTER عداد الفلر	155,104 cont.
PACKER COUNTER عداد التغليف	12,967 pack
PALLETISER COUNTER عداد البالتة	12,918 pack
REJECTOR I COUNTER عداد الرفض I	cont.
REJECTOR II COUNTER عداد الرفض II	155,057 cont.
PET LINE ONLY	
PREFORM COUNTER عداد البريفورم	155,692 cont.
BLOWMOULDER COUNTER عداد النفخ	155,282 cont.
LABLER COUNTER عداد الليبل	155,128 cont.
CAN LINE ONLY	
DEPALLETISER COUNTER عداد البالتة	cont.

PRODUCTION BREIEF	
GROSS PRODUCTION الانتاج الكلي	12,925 pack
GROSS PRODUCTION THEO. الانتاج الكلي / النظري	13,775 pack
NET PRODUCTION الانتاج الصافي	12,918 pack

PRODUCTION WASTE	
PACKAGE LOSS خسارة التعبئة	0.3791 %
PRODUCTION BREAKAGE مكسور الانتاج	0.0567 %

SCHEDULED DOWNTIMES DETAILS				
S1: Maintenance		min	0	%
S2: Sanitation	2	min	6	%
S3: Line Charging		min	0	%
S4: Line Clearing	5	min	15	%
S5: Line Preparing		min	0	%
S6: Line Change Over		min	0	%
OPERATIONA DOWNTIMES DETAILS				
O1: No R.M.		min	0	%
O2:No Syrup		min	0	%
O3:Quality		min	0	%
O4; No. Utilities		min	0	%
O5:No Forklift		min	0	%
O6: No. Electricity		min	0	%
O7: Bad Packageing Materials		min	0	%
O8: Change Over Adjusting		min	0	%
EQUIPMENT DOWNTIME DETAILS				
E1: Filler	5	min	15	%
E2: Mixer		min	0	%
E3: Packer		min	0	%
E4: Labler	15	min	44	%
E5: Palletiser		min	0	%
E6: Depalletiser		min	0	%
E7: Blowmolder	9	min	26	%
E8: Conveyors	5	min	15	%
E9: Coder		min	0	%
E10: Rejector		min	0	%
E11: Seamer		min	0	%
DOWNTIMES SUMMARY				
SCHEDULED DOWNTIME مجموع توقفات الفلر المجدولة	7	min	21	%
OPERATIONAL DOWNTIME مجموع توقفات الفلر التشغيلية	0	min	0	%
EQUIPMENT DOWNTIME مجموع توقفات الفلر المعدلية	34	min	100	%

Appendix 3

AL Hayat Soft Drinks & Mineral Water Co. Production Department

Pet Line Weekly Brief Production

CAN LINE															
DAY	Sat.		Sun		Mon		Tue		Wed		Thu		Fri		WEEKLY RESULTS
DATE	7/6		7/7		7/8		7/9		7/10						
PRODUCTION RUN NO.	7/4		7/5		7/6		7/7		7/8						
PERFORMERS NO.	12		12		12		12		12		12		12		12
TIME															
RUN START TIME (hr/min)	12	45	9	20	10	10	9	0	5	0					33.53
RUN STOP TIME (hr/min)	16	50	17	6	17	6	17	0	11	45					
PRODUCTION RUN TIME (hr)	4.08		7.77		6.93		8.00		6.75		0.00		0.00		
LINE SPEED (bph)	17000		17000		17000		17000		17000						17000
PRODUCTION SCHEDULE															
FLAVOR TYPE	PEPSI		PEPSI		PEPSI		PEPSI		MIRINDA O						
PACKAGE SIZE	6	1.75	6	1.75	6	1.75	6	1.75	6	1.75					
COUNTERS															
PREFORM COUNTER (preform)	55,523		92,451		84,174		95,515		84,549						412212
FILLER COUNTER (bottle)	54,961		91,587		83,085		94,112		83,857						407602
PALLETISER COUNTER (case)	9,146		15,254		13,833		15,670		13,965						67868
SCHEDULED DOWNTIME (min)	6		6		6		6		6						30
OPERATIONAL DOWNTIME (min)	0		8		25		23		6						62
EQUIPMENT DOWNTIME (min)	45		129		92		119		97						482
TOTAL FILLER DOWNTIME (min)	45		137		117		142		103						543
PRODUCTION RESULTS															
NET PRODUCTION (case)	9,146		15,254		13,833		15,670		13,965						67868
GROSS PRODUCTION (case)	9160		15265		13848		15685		13976						67934
GROSS PRODUCTION THEO. (case)	11286		21722		19361		22383		18842						93594
NET EFFICIENCY (%)	81		70		71		70		74						73
PRODUCTION PRODUCTIVITY	191.64		166		169		165		175						171
PACKAGE LOSS (%)	1.0225		0.9434		1.3107		1.4908		0.8252						1.1310
PRODUCTION BREAKAGE (%)	0.0237		0.0033		0.0181		0.0213		0.0083						0.0142
PACKAGE LOSS (bottle)	562		864		1089		1403		692		0		0		4610
PRODUCTION BREAKAGE (case)	2		1		3		3		1						10
PACKAGE LOSS ($)	60		93		117		150		74						494
PRODUCTION BREAKAGE ($)	9		2		10		14		5						40

Appendix 4
Stock Cost and Balances during January 2013

FinanceDept.

Stock and it's Cost Balance $ for the Production during january /2013

Volumes	Kinds	Stock of finish Goods in 1- January-2012 QNTY.	Stock of finish Goods in 1- January-2012 Cost $ /package	Activity during january/2012: Production & imported finish Goods January/2012 QNTY.	Production & imported finish Goods January/2012 Cost $ /package	Branches Cost $ /package	Stock in hand QNTY.	Stock in hand Total Ammount $	Cost $ /package	Damage or Gift Goods: Gift	Damage	Gift cost $	cost $Damage	cost $ (damage+ gift)	Total Sales in Erbil & Others QNTY.	Total Sales in Erbil & Others Total Ammount $	Cost$ /package	Final Stocking Goods in 31/January/2012: ...rawal of...	...rned G...	TOTAL STOK QNTY.	COST $
150 ml	Pepsi	43885	$4.59			$4.59	43,885	$201,453	$4.59	1		5	0.00	$5	18,241	$83,735	4.59	8		25,635	117677
	Mirinda Orange	35239	$4.73			$4.73	35,239	$166,584	$4.73	2	1	9	4.73	$14.2	8,041	$38,012	4.73			27,195	128558
	7UP	18591	$4.68			$4.68	18,591	$87,023	$4.68	2		9	0.00	$9.4	10,434	$48,841	4.68		8	8,163	38210
	Diet Pepsi	0					-					0	0.00	$0.0		$0		-		0	0
	Diet 7UP	0					-					0	0.00	$0.0		$0		-		0	0
	Shani	0					-					0	0.00	$0		$0		-		0	0
	MirindaApple	0		15,048	$4.729	$4.73	15,048	$71,164	$4.73	1					3,250	$15,370	4.73			11,797	55789
	Mountain Dew	14816	$4.70	17,430	$4.761	$4.73	32,246	$152,643	$4.73	2		9	0.00	$9	7,295	$34,532	4.73			24,949	118101
	Total	112,531	19	32,478			145,009			8	1				47,261	$220,489		8	8	97,739	458,335
250ml	Pepsi	58324	4.978	83,758	$5.232	$5.13	142,082	$728,588	$5.13	181	9	928	46	974	62,891	$322,501	$5.13			79,001	405112
	Mirinda Orange	30148	$5.32	52,159	$5.425	$5.38	82,307	$443,199	$5.38	63	5	339	27	366	32,600	$175,541	$5.38			49,639	267291
	7UP	15950	$5.16	54,003	$5.252	$5.23	69,953	$365,985	$5.23	15	33	78	173	251	29,325	$153,425	$5.23			40,580	212309
	Diet Pepsi	4774	$5.01			$5.01	4,774	$23,917	$5.01	1	38	5	190	195	2,745	$13,752	$5.01			1,990	9970
	Diet 7UP	1687	$4.86	5,346	$4.738	$4.77	7,033	$33,524	$4.77		4	0	19	19	1,885	$8,985	$4.77			5,144	24520
	Mountin Dew	23349	$5.29	21,536	$5.406	$5.35	44,885	$239,947	$5.35	42		225	0	225	5,101	$27,269	$5.35			39,742	212453
	Mirinda hibiscus						-					0	0	0						0	0
	Pepsi MIX	0					-					0	0	0						0	0
	M.POMEGRANATE	0					-	$0				0	0	0		$0.00				0	0
	Total	134,232	31	216,802			351,034			302	89				134,547	701,474		0	0	216,096	1,131,656
330 ml	pepsi	14872	$4.98			$4.98	14,872	$74,102	$4.98	18	3	90	15	105	10,954	$54,580	$4.98			3,897	19417
	Mirinda Orange	12071	$5.16			$5.16	12,071	$62,295	$5.16		5	0	26	26	2,265	$11,689	$5.16			9,801	50580
	7UP	7446	$4.99			$4.99	7,446	$37,155	$4.99		22	0	110	110	4,286	$21,387	$4.99			3,138	15658
	Total	34,389	15	-	-		34,389			18	30				17,505	87,656		-	-	16,836	85,656
750ml	Pepsi	7252	$3.74	46,892	$3.662	$3.67	54,144	$198,839	$3.67	66	4	242.4	14.7	$257	27,758	$101,939	$3.67			26,316	96643
	Mirinda	9140	$3.93	12,309	$3.893	$3.91	21,449	$83,842	$3.91	3	4	11.7	15.6	$27	11,044	$43,170	$3.91			10,398	40645
	7UP	11001	$3.42			$3.42	11,001	$37,647	$3.42	5	4	17.1	13.7	$31	8,689	$29,735	$3.42			2,303	7881
	Mountin Dew	262	$3.98	18,055	$3.981	$3.98	18,317	$72,918	$3.98			0.0	0.0	$0	4,576	$18,217	3.98			13,741	54701
	Total	27,655	11	77,256			104,911			74	12				52,067	193,060		-	-	52,758	199,870
1.5	Total	-		-			-			0	0					-		0	0	-	-
1.75lt	Pepsi	11929	$3.344	39,969	$3.473	$3.44	51,898	$178,722	$3.44	3,421	7	11,781	24	$11,805	24,222	$83,414	$3.44			24,248	83503
	Mirinda	21667	$3.580	18,367	$3.739	$3.65	40,034	$146,241	$3.65	1,268	19	4,631.9	69	$4,701	11,687	$42,692	$3.65			27,060	98848
	7UP	10210	$3.33	10,493	$3.497	$3.42	20,703	$70,736	$3.42	718	14	2,453.2	48	$2,501	5,723	$19,554	$3.42			14,248	48681
	Total	43,806	10	68,829			112,635			5,407	40				41,632	145,659		-	-	65,556	231,032
2.25lt	Pepsi	1	$3.56			$3.56	1	$4	$3.56		1	0.0	4	$4		$0	$3.56			0	0
	Mirinda	1	$3.94			$3.94	1	$4	$3.94		1	0.0	4	$4		$0	$3.94			0	0
	7UP	6				$0.00	6	$22	$3.66		6	0.0	22	$22		$0				0	0
	Mirinda Apple	0					-	$0				0.0	0	$0		$0				0	0
	Total	8	7	-	-		8			0	8				.	.		0	0	.	.
	Total Quentities	352,621	2463347	395,365			$747,986	$3,476,551		5,809	180	$20,835	$825	$21,660	293,012	1,348,337		8	8	448,985	2,106,549