Chapter 2 – Theoretical Foundation

This chapter will review all the theoretical foundation that will be used during the production of this thesis. This theoretical review is made with the hope to help the reader to understand the variety of background that will be used.

2.1. Manufacturing Industry

Unlike any other industrial field in the world, manufacturing industry includes business engaged in mechanical or chemical transformation of materials or substances from raw to usable or sellable products. Some examples for companies which can be considered as a company which is working in the manufacturing area are; plants, factories (pharmaceuticals, beverages, etc.), mills, component parts assembly, material blending (e.g. liquors, plastics, etc.). A factor which distinguishes manufacturing industry with other industry is the number of employees employed and engaged in it. Manufacturing industry has many employees, ranging from hundreds to thousands of employees. Hence, the majority rules of a manufacturing industrial are the rules concerning the employments and labors. Some examples of employment in manufacturing industry are:

- The workers perform their services on a part-time basis, and usually within 8 hours of working time per day and the next's shift workers will continue with the previous workers' work.

- The workers are paid based on their working hour and are paid every week, etc.

Some terminology that is used within a manufacturing industry is:

- ✓ Back Order – is a typical term in any manufacturing industry, whenever a manufacturing company has a smaller amount of stock of their products in the inventory than to what the customer is ordering /requesting. For instance, TM has only 50 units of tire in the warehouse; unfortunately, an order of 100 tires came with the exact type and series. It is certain that the customer will not obtain 100 units of tires eventually. Hence the customer may do back order, which will specify the customer's order and payment of the amount requested, which is 100 tires, and receive only 50 units of tires, and the other 50 tires will soon be manufactured and delivered to the customer as soon as the products are ready.

- ✓ Drop Ship – often occur in a multi-national company. This is a direct shipment of something sold by a retailer to a consumer that is shipped directly from the manufacturer or wholesaler to the consumer. An example for a drop ship would be; a retailer A has been requested 100 tires from consumer B, however, A does not have a stock of 100 tires of what B is requesting, thus, A make a request to the tire manufacturer (C) to do deliver a 100 units of tires from C's warehouse directly to B.

2.2. Finding Fact Techniques

In advance of creating the model to the database, as an analyst, we would have to gather information, pull together all the facts regarding the contemporary system that had been used by the organization itself. *A database developer normally uses several fact-finding techniques during a single database project* (Thomas Connolly & Carolyn Begg, Addison Wesley, 2002). The techniques that are going to be used herein this thesis is:

2.2.1 Interviewing

Interviewing is the most commonly used and the most efficient tool to gather information of the pertinent organization. The interview can be arranged individually to the desired interviewee face-to-face and also to a group of similar interests, or department. Several objectives that we can derive by using interview is that, by interview we can see peoples' enthusiasm, clarifying facts from the customers and users, getting the end-user involved directly to the system generation, identifying requirements more specifically and without ambiguous statement rather than using questionnaires to gather all the information and requirements need to be fulfilled. Even though interview can be a powerful tool to be used to gather information, it requires good communication skills for dealing effectively with other people that have different values and personalities. As with other fact-finding techniques, interviewing is not the best method for all situations. A successful interview can be derived from selecting appropriate

individuals to be interviewed, preparation of extensive set of questions and an effective and efficient manner of interview conduct.

Advantages	Disadvantages
• Allow interviewee to respond freely and openly to questions • Allows interviewee to feel part of project • Allows interviewer to follow up on interesting comments made by interviewee • Allows interviewer to adapt or re-word questions during interview • Allows interviewer to observe interviewee's body language	• Very time-consuming and costly, and therefore may be impractical • Success is dependent on communication skills of interviewer • Success can be dependent on willingness of interviewees to participate in interviews

Referred from Thomas Connolly & Carolyn Begg, Addison Wesley, 2002

Table 2. 1. Interview advantages and disadvantages

The two types of interview that are commonly practiced are;

2.2.1.1. Structured Interviews

In structured interviews, the interviewer has already prepared a specific set of questions to be asked to the interviewee. Additional questions might be also be derived depending on the interviewee's responses during the interview. These additional questions are to obtain clarification or expansion to the interviewee's answers during the interview session.

2.2.1.2. Unstructured Interviews

Normally, unstructured interviews are conducted abruptly with only mind-generated general objective and with few, if any specific questions. The interviewer counts on the

interviewee to provide framework, direction and limitation to the interview. This type of interview frequently loses focus and often does not work efficiently and effectively to the success of information and user specification data gathering.

2.2.2. Research

Research could be one useful fact-finding technique of the application and problem. Nowadays, globalization had filled out the entire human societies with their computerization era, computer journals, reference books, and the Internet, has been a good information sources worldwide.

Advantages	Disadvantages
• Can save time if solution already exists • Researchers can see how others have solved similar problems or met similar requirements • Keeps researchers up to date with current development	• Can be time-consuming • Requires access to appropriate sources of information • May ultimately not help in solving problem because problem is not documented elsewhere

Taken from Thomas Connolly & Carolyn Begg, Addison Wesley, 2002

Table 2. 2. Research advantages and disadvantages

2.2.3. Observing the enterprise in Operation

Observing is one of the most effective fact-finding techniques for understanding a system. This technique enables the observer to either participate in, or watch, a person perform activities to learn about the system deeper. This technique is particularly is commonly

helpful to be used when the validity of data collected trough other method is in question or when the complexity of certain aspects of the system prevents a clear explanation by end users, since by observing right away to the enterprise of the operation, the observer will be able to see thorough what is really going on and to note where, if any, mistakes occur during certain period of time. Consequently with other fact-finding techniques, successful observation requires appropriate preparation.

Advantages	Disadvantages
• Allows validity of facts and data to be checked • Observer can see exactly what is being done • Observer can also obtain data describing the physical environment of the task • Relatively expensive • Observer can do work measurements	• People may knowingly or unknowingly perform differently when being observed • May miss observing tasks involving different levels of difficulty or volume normally experienced during that time period • Some tasks may not always be performed in the manner in which they are observed • May be impractical

Taken from Thomas Connolly & Carolyn Begg, Addison Wesley, 2002

Table 2. 3. Observing the Enterprise in Operation advantages and disadvantages

2.3. Theoretical framework

The theoretical foundation that will be used herein this thesis, will be concisely listed and partially being described and explained with the intention to give clearer understanding of this thesis and the methods that will be used and accustomed for further intention in the future.

2.3.1 Flowchart

A flowchart system will use the entity of each process and indentify each program along with the data the entity will be accessing in the process. It also shows the relationships between two or more entities to give a clearer view on the process mapping. According to Satzinger (2004), the system flowchart is the representation of various computer programs, files, databases, and associated manual procedures that make up a complete system. Processes in the flowchart, will be grouped into the same or similar subsystem. The basis of these groups could vary from the shared timing of the process, shared access to the store data, or into shared user groups such as processes that is used for the marketing department, and so on. The programs and processes thus created have complex independencies which include their data flow, flow of control, and the interaction of the data itself to the data store in the system.

A system flowchart is one of the tools in system analysis and design that can be used to graphically map down the processes of a system which allow the user to see visibly the flow of data and controls among them. The symbols that are used in a system flowchart will be listed below;

Symbol	Label	Description
	Process or Diagram	The process which is occurring or stating at the current time.

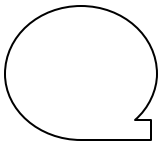
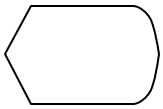
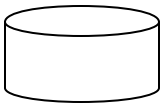
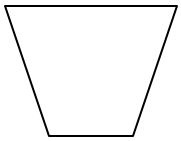
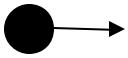
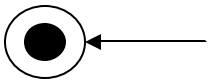
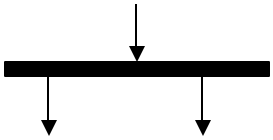
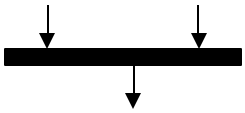
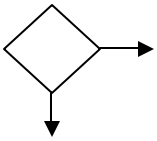
	Stored File or Database	File or database that is stored in the process
	Document or Report	Document or report that is used or produced by the system or process.
	File on Magnetic Tape	Physical implementation of file during the process. This physical implementation description by identifying the file media, disk, or tape.
	Input or output	The input or output screen display in the system
	File or Database	File or database that is used in the process
	Manual operation	The manual operation that should be done manually by the actor or user in the process. For instance, typing the purchase order, inspect checks, etc.
	Data flow or Connection between components	flow from one component to another component, carrying the data in it, to complete a process

Table 2. 4. Flowchart Symbols

2.3.2. Activity Diagram

As mentioned by Satzinger (Satzinger J.W., 2004), an activity diagram is a type of workflow diagram that describes the user activities and their sequential flow. In activity diagram, the workflow of one data that is being passed through one department to another department is clearly stated at the top of each workflow table. Symbols that are used in activity diagrams are:

Symbol	Label	Description
	Document	Stored document to be used
	Starting Activity	The beginning of the workflow activities
	Ending Activity	The ending of the workflow activities
	Transaction Arrow	Data at rest, being stored for later use. Usually corresponds to a data entity or an entity-relationship diagram.
	Process	The individuals process in a workflow
	Synchronization Bar (Split)	Splits the path into concurrent paths in the workflow diagram
	Synchronization Bar (Join)	Recombines the multiple concurrent paths in the workflow diagram
	Decision Making	a decision point at which the flow of the process will follow either one path or the other path

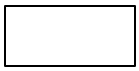
Taken from Jeffrey L. Whitten & Associates, McGraw Hill, 2004

Table 2. 5. Activity Diagram symbols

2.3.3. Structure Chart

A structure chart are usually used in creating an organizational chart, since a structure chart hierarchically plot a diagram which describes the functions and sub functions, a system and subsystem, and even a

division and subdivision of the system itself. The primary objective a structured design is to create a top-down decomposition of the functions to be performed by a given program in a new system (Satzinger J.W., 2004). The symbols that are used in a structure chart are:

Symbol	Label	Description
	Division	The head- and the sub- of each process or department or authorities will be labeled with a rectangle
	Data flow connection	The flow connection of each authority. The point of which the arrow is pointing, means that the above (the tail of the arrow) is the head of the sub- (the head of the arrow).

[Table 2.6 – Structure Diagram symbols

Table 2. 6. Structure Diagram symbols

2.3.3. Financing and Accounting Standards

According to Weygandt J.J. accounting is an information system which *indentifies, records, and communicates* the economic events of an organization to interested users. While on the other hand, finance is the business or art of managing the monetary resources of an organization, or can be defined as a system that *control the money* flow. So, to sum up, accounting is a system that record and identify where the money would go, in or out of the organization, while finance would be a system that manage and control the actual money in or out of the organization. The good example and illustration of finance and accounting will be mapped in the diagram below

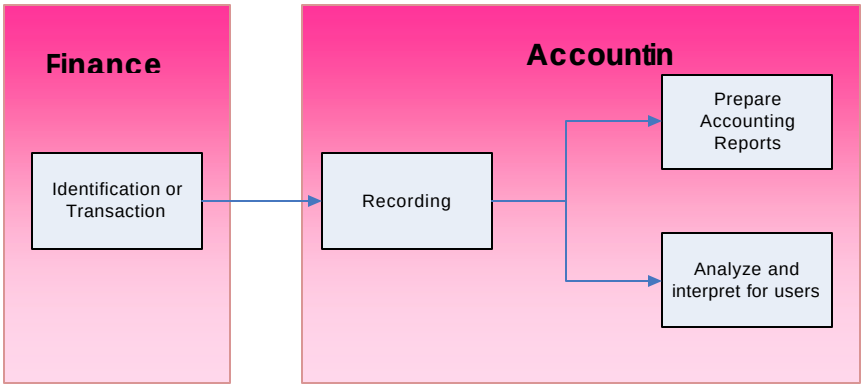


Figure 2. 1. Finance and Accounting differentiation

2.3.3.1 Financial Statements

Every company with an ongoing business process must have had financial statements which will be recorded and reported to their managers, directors, their stakeholders (Internal users) or even to their ***investors*** who will be using the accounting information to make decision, whether to buy, hold or sell their stocks, ***creditors*** such as suppliers and bankers would using the accounting information to evaluate the risks of granting credit or lending money, ***taxing authorities*** who would be using company's accounting information to know whether the company complies with the tax law of the company's location in certain country, ***regulatory agencies*** such as securities and exchange commission, ***customers*** who are interested in whether the company will keep on moving on to honor the product warranties and support its product line, ***labor unions*** which would want to know the capabilities of the company to pay off their labor with increased wages and benefits or even to

economic planners who uses the accounting information to forecast economic activities of one's company (External users) within particular period of time which was set by the company itself. The accounting department will be the one that is in control and responsible to the company's financial statements. Alfredson K. et al mentioned that financial statements portray the financial effects of transactions and other events by grouping them into broad classes according to their economic characteristics. These broad classes, nowadays, are known as the elements of financial statements. The elements of financial statements are directly related to financial positions (balance sheet) are:

- **Assets** – A resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity (Alfredson K. et al 2005).
- **Liability** – is a present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits Assets – A resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity (Alfredson K. et al 2005).

- **Equity** – is the residual interest in the assets of the entity after deducting all its liabilities (Alfredson K. et al 2005).

The elements of financial statements are directly related to performance, the income statements, are:

- **Income** – is the increases in economic benefits during the accounting period in the company. Income will increase the economic benefits of one company in the form of inflows or enhancements of assets or by decreasing the amount of the liabilities which will result in the reduction of equity, other than to those relations directly or indirectly to contribute the equity participants, or in other words the stakeholders. The definitions of income encompasses both revenues and gains for the company, which arises in the course of the normal operation activities of the company, such as sales of goods and services produced by the company (Alfredson K. et al 2005).
- **Expenses** – is the diminution in economic benefits during the accounting period in the form of outflows or depletions of assets or incurrence of liabilities that will result the equity to be decreased apart from those related to the equity participants (stakeholders). On the other hand, the definition of expenses encompasses

kisses as well as those expenses that arise in the course of the ordinary activities of entity such as cost of sales, wages marketing costs, administrations costs and depreciation of assets in the company. Expenses usually take form of an outflow or depletion of assets such as cash and cash equivalents (check, etc.), inventory, property, plant and equipment.

In the International accounting standards, there are several financial statements which a company with an ongoing business procedure, with incomes and expenditures has to encounter in order to be adequately ordered, transparent, and clear throughout the company and organizations to provide the company with sufficient, well known way by most accountant in the world, and easy to read with clear description for the company use. The financial statements that would be sufficient and adequate for a company are:

- **Income statement** – is the statement of reports on the entity's revenues and expenses for the reporting period (Alfredson K. et al 2005). In the income statement of each company, will indicate the income of the company, also known as the revenues from the sales of the company, deducted with the expenses and depreciation occurred during the current period of the

income statement production. Another definition is that income statements are the periodic income summary showing the profit or loss sustained by a company during a particular period, including all items of income and expenditure (Encarta Dictionary Tools, 2007). An income statement presents the revenues and expenses of a company and resulting net income or net loss for a specific period of time (Weygandt J. J. et al 2005).

- **Balance Sheet** – One of the four financial statements is the balance sheet. Balance sheet according to Alfredson, K et al is a financial statement that presents assets and liabilities and equity of an entity at a given point in time. Balance sheet is the statement of debits and credits of a company that shows up the assets and equity combined with the liability is of a company at a particular period of time. Explicitly, balance sheet can be defined as a report which state and report the assets, liabilities and owner's equity for a specific period of time. The formula for balance sheet is ***Asset = Liabilities + Owner's Equity***.
- **Cash Flow Statement** – Unlike both financial statements I mentioned earlier which are the basic steps and elements of financial statements, cash flow statement or also known as statement of cash flow is a

more advanced financial statement that provides information about the cash payments and cash receipts of an entity during a period of time. Statement of cash flow summarizes information about the cash inflows (receipts) and outflows (payments) for a specific particular of time.

- **Statement of changes in Equity** – or owner's equity statement is a financial statement prepared in accordance with International Accounting Standard (IAS) for conclusion in general purpose financial reports. The statement reports on the changes in the entity's equity for the reporting period. Changes in equity disclosed may include movements in retained earnings for the period, items of income and expense recognized directly in equity, and movements in each class of share and each reserve. In other words, owner's equity statement summarizes the changes in owner's equity for a specific period of time (Weygandt J. J. et al 2005).
-

2.3.3.2 Accounting Terminology

Several accounting terminology that are often used will be listed herein this thesis with all their brief description;

Accounting term	Description
Assets	
▪ Cash	Money in the form of bills or coins that is received by the company
▪ Receivables	A bill or account that is due to be paid by the customer or by the money borrower
▪ Fixed assets	An asset of a business that is central to its operation and permanently owned by the company. Or an asset that can be used for at least 5 years of time.
▪ prepayment expenses	A small amount of payment or expenses that a company will have to pay in advance yet received the product that desired.
Liabilities	
▪ Payables	Payment that has to be fulfilled by the company to their money lenders, such as banks, creditors, or suppliers.
▪ Expenses	money of the company that are spent on something
▪ Depreciation	Portion of original cost of a fixed asset that are converted to expenses. Or in other words, depreciation is the systematic and rational allocation of a long-lived item from asset (fixed assets) to expense.
▪ Accumulated Depreciation	More depreciation expenses that are recorded in future period.
Owner's Equity	
▪ Common Stock	Stock entitling holder to dividend in line with the company's profits.
▪ Retained Earnings	Earnings which will not distributed to the company's stockholders.
Accruals	
▪ Accrued Revenue	Revenues appropriately recognized under accrual accounting in one income statement period although the associated cash will be received in a later income statement period.
▪ Accrued Expenses	Expenses appropriately recognized under accrual accounting in one income statement period although the associated cash will be paid in a later income statement period
Deferrals	

▪ Deferred Revenues	Revenues created when cash is received before the revenue is earned.
▪ Deferred Expenses	Expenses created when cash is paid before any benefit is received.
Accounting manufacturing terms	
▪ Raw material / material	Natural unprocessed material purchased by a company that can be potentially useful to make to company's product.
▪ Work-in-process (WIP)	An incomplete term of a material which is not yet been finished
▪ Finished Goods	Product that has been produced and completed with skill and professionalism, and yet has not been sold.
▪ Cost of Goods Sold (COGS)	The cost of the product sold as the primary business activity of a company
Profit/Loss	
▪ Profit	The excess of benefit over sacrifice
▪ Loss	Net outflows resulting from peripheral activities of a company.

Table 2. 7. Accounting Terminology

2.3.3.3 Ledger Accounts

A ledger contains the records for a group of related accounts (Horngren 2006). A ledger could be found in the form of a bound record book, a loose-leaf set of pages, or some kind of electronic storage elements. Like any other financial statements being produced by any organizations, a ledger are usually kept in a systematically order, to ease the future user in searching and help in making financial decisions. Not many differences between ledgers, general ledgers are the collection of accounts that accumulate the amount reported in the major financial statements.

2.4. ERP (Enterprise Resource Planning)

As an advance application program, Enterprise Resource Planning (hereinafter will be stated as ERP) systems attempt to do integration data and processes of an organization into a unified system, which will lead to bigger efficiency and effective rate for the company's productivity. ERP application has been used wisely for many companies for better recognition of decision-making processes, enhanced coordination, and greater responsiveness both internally and within their extended supply chain (Wallace 2001). Most of the ERP application provides single database which will be containing all the data gathered from the company (single database) from all modules to all data, ERP application might cover and include the following area of the company;

- Manufacturing; covering engineering part, bill of material, scheduling, capacity, workflow management, quality control, cost management, manufacturing process, manufacturing projects manufacturing flow.
- Supply Chain Management; covering inventory, order entry, purchasing, product configuration, supply chain planning, supplier scheduling, inspection of goods, claim processing, commission calculation.
- Financials; covering general ledgers, cash management, account payable, account receivables, fixed assets, financial statements.

- Projects; covering costing, billing, time and expense, activity management.
- Human Resources; covering human resources, payroll, training, time and attendance, benefits.
- Customer Relationship Management; covering sales and marketing, commissions, service, customer contact and call center support.
- Data Warehouse; covering various self-service interfaces for customer, suppliers and employees.

According to Wallace et al, 2002, ERP predicts and balances demand and supply. It is a widely used tools of forecasting, planning and scheduling which could links the suppliers and the customer into a complete and reliable supply chain, proved to able to employ good decision making, and could coordinate sales, marketing and operations, logistics, purchasing, finance, product development, and human resources. And the goal of a company using ERP is that it could improve the level of customer service, productivity, cost reduction and inventory turnover, and it provides the foundation for effective supply chain management and e-commerce (Wallace 2002).

2.5. Microsoft business Solution System

As stated by Microsoft, a successful company is directly related to the success of the employee of the company itself. Based on those beliefs, Microsoft created and produces a line of integrated, adaptable business management solutions which enables the shareholders, managers,

supervisors to be able to make significant business decisions with greater confidence, which is called the Microsoft Business Solutions Systems. Microsoft Business Solution System, which is known nowadays as Microsoft Dynamics, is an ERP application that is produced under the license of Microsoft. Just like any other Microsoft products, Microsoft Dynamics are easy adoptable and reducing the risks of inherent with implementing a new solution. These solutions are automated and set in a streamline financial, customer relationship, and supply chain processes in a way that can help the adopter company to drive the company business to success. As an easy and well integrated ERP application, Microsoft dynamics solutions are built and compatible with the applications and services for retailers, manufacturers, wholesalers, distributors, and service companies. Microsoft Dynamics solutions enhance all lines of business in the organization and delivers exceptional benefits in three critical areas, which are:

- Financial management: helps to maintain control of the organization's finances and managing them with a high level of efficiency. Complete, current financial information and reports are available to be derived simply from anybody who needs it to perform business planning. Besides that, Microsoft Dynamics solutions also provide simplify and automate routine and repetitious functions, so the company's employees can focus more on the critical tasks.
- Customer relationship management (CRM): this efficiency of Microsoft Dynamics solutions, help the company to maintain close

contact with the company's customers and prospects, and manage sales and marketing initiatives and track their results. This ERP application of Microsoft will also assist the inherit ERP application in identifying emerging customer needs early and respond them before the competitors do, which is very beneficial for the company image.

- Supply Chain management: with Microsoft Dynamics Solutions, the company will able to connect the entire supply chain in a more productive, fast-moving flow, an overall assessment of the business value of the vendors and other business partner relationships to make sure they suit the company's objective. Microsoft Dynamics also offers sophisticated communicative, collaborative, and self-service capabilities to make it easy and compelling for other companies to do business with the company. This will then lead to an increase percentage of efficiencies in distribution to improve customer satisfaction and reduce of cost of doing business.

Microsoft Dynamics solutions system offers several of its products with different functions and specifications, the overview of the products are as follows;

- Microsoft Dynamics GP – short for Great Plains – offers a powerful, cost effective resource planning and management tools that enable the users to collaborate with their trading partners, managing the entire financial life cycle of the manufacturing business process, and build a sustainable advantage in the industry. Besides those

descriptions of GP, it also helps in growing midsize company to rise and run faster by maximizing the productivity of the employees, which will be achieved by including robust financial and operation functionality such as business intelligence, reporting, budgeting and forecasting.

- Microsoft Dynamics AX – short for Axapta – is a comprehensive business solutions offered by Microsoft that provides midsize and larger organizations end-to-end industry specific functionality. In manufacturing area, Microsoft Dynamics AX is able to help the employees streamline production and minimize inventory-carrying costs, configure complex products, and manage personnel, material and data processing more effectively. Microsoft Dynamics are also built to make it easier to do businesses in different locations and across countries.
- Microsoft Dynamics CRM – short for Customer Relationship Management – is a solution provided by Microsoft that provides the tools and capabilities needed to create and maintain a clear picture of customers, from the very first contact with the company's employee through purchasing up until the post-sales. Integrated with good sales, marketing and customer service modules, Microsoft Dynamics CRM delivers a fast, flexible, and affordable solution which enables closer relationship with customer and helps user to achieve new levels of profitability.

- Microsoft Dynamics NAV – short for Navigation – is a business management solution for small and midsize organizations which helps to simplify and streamline highly specialized business processes by rapidly adapting to the unique way of user to do business, and enabling the employees of the organization to work effectively and for the business to me more competitive.
- Microsoft Dynamics Point of Sale – this application streamlines single store inventory management and reporting, automates transaction processing start-to-finish, and makes it easier to track down customer information and maintain detailed customer history.
- Microsoft Dynamics RMS – short for Retain Management System – offers a complete Point-of Sale (POS) solution that can be simply adapted to meet unique retail requirements.
- Microsoft dynamics SL – this application is specialized to help project-driven midsize organizations to obtain reports and business analysis, as well as helping the increasing number of efficiency, accuracy, and customer satisfactory percentage in overall. This application also helps the user to validate the running projects by certifying that it is estimated correctly, completed beyond the appropriate timeline given, and the most important is meeting the customer requirements.
- Microsoft Dynamics Snap – this application is part of the new breed of applications called Office Business Applications (OBAs) – which is able to assist the employees easily getting timely and accurate data

out from or into the ERP applications without any requirements to leave the Microsoft Office application, in which are the most familiar application among businesses in the world. This application helps save time, boost productivity, speed collaboration, and improve processes