A MODEL ON FACTORY INFORMATION SYSTEM (FIS)

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Abstract: *In the globalization era, rapid data communication and sufficient information is important to make the right decision at the right time. At present, various organizations/ industries in Bangladesh are using paper based methods, which are time consuming. Recently, few organizations have installed computerized systems instead of traditional systems. The use of internet-based technologies to communicate information is one of the best approaches to support the informational needs of various departments of an organization. In this research work a case study was performed on a specific Garments Industry. The existing information model of that factory is studied and then a conceptual information model named Factory Information System (FIS) was suggested. Then software was developed for a smooth flow of information. The developed software is composed by two sections that are design database and functions of programs or user interfaces design. The software is built using PHP with My-SQL database.*
Keywords: Information sharing, Online data flow and storage, Online data retrieval.
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1. Introduction

In most organizations, information flow plays a vital role for proper workplace activities. The usage of computer makes it possible to do efficient and quick work and get accurate results in every field of life e.g. industry,

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agricultural research, engineering and medical. It is extremely difficult to organize and to maintain the current and old official records manually. Most of the organizations are storing their data manually, putting their precious records at risk without any security. The search for a specific file is cumbersome process and some time they fail in their search, this leads to realization to ease their work, which is possible with computers having sophisticated and user-friendly software.

The effective management of information requires information technology and that technology is therefore crucial to organizational success. Using IT systems to capture and analyze information can have a significant impact on a firm's performance. Information technology comes in many forms-networked personal computers, software applications, the Internet and more-but one thing all types of information technology have in common is that their effective use depends upon users. People put the technology to work in managing information and people are ultimately responsible for whether information technology succeeds or fails. Over the last 15-20 years the apparel sector has been in a state of continuous restructuring. A combination of technological and socio-economic changes, production cost, liberalization and the emergence of important international competitor from Asia and the Mediterranean region are influencing the apparel manufacturing sector of Bangladesh (Williams, L.R., Esper, T.L., Ozment, J., 2002, pp. 703-719). Apparel manufacturers are facing increasing competition and cost pressures. Hence efficient information flows within inter department seem to be an important key factor for apparel industries in Bangladesh for improving better coordination among them. In this paper, a conceptual model (Factory Information System Model) is developed. FIS Model considers the specific requirements for smooth flow of information within various department of an apparel industry. The Factory Information System will help to share information among various departments such as cutting, printing, embroidery, sewing, washing, finishing and shipping of an apparel industry. The program will show necessary information in planning process for each departmental function. The developed new system is composed by two sections that are design database and user interfaces design. The objective of this research is to find out a smooth information flow model by developing online software for the apparel industry of Bangladesh and to develop a model on Factory Information System (FIS).

2. Research background

Ready Made Garments (RMG) sector of Bangladesh today are operating in a highly competitive global environment. The phasing out of quota privileges and facilities from developed countries offers new challenges as well as opportunities. The challenges include becoming more competitive in terms of quality, price and on time delivery. In the new economy, the focus has been on; building on core strength; provision of real-time information; visibility of key performance indicator; collaboration in supply-chain operation and e-commerce development. The web based information system has several advantages and overcome some traditional problems. These includes: (1) single data entry to minimize human error; (2) real-time online ordering function; (3) multi-level password controls (so that different` functions have different access levels controlled by their respective authorized people). At present there are many systems to provide smooth information flow through the organization but this is too expensive to implement in the composite apparel industries. These difficulties provide the opportunities to build an effective and efficient system for the composite apparel industry from where all the information can be accessed and updated by individual department and can be retrieved when necessary. Some software companies now-a-days are making software on the basis of production information system and Human resource information system etc. They develop the software according to companies demand. Although that software is very much strong in structure but it's expensive and difficult to maintain. So, most of the apparel industries are incapable to use those software. Basically the development of the software is reflection of current production process of the apparel industry. PHP language and MYSQL database (XAMPP) is used to develop the software.

3. Information - a resource

Information is 'live' as it is required to be updated all the time and is renewable. It is substitutable and transportable and can be made to travel. The all round exponential growth of information makes it necessary that information is collected, stored, and retrieved in various fields so that it could be usefully exploited as and when needed. Information is an important driver that companies have used to become both more efficient and more responsive. The tremendous growth of the importance of information

technology is a testimony to the impact that information can have on improving a company. By using information technology companies reach a point when they must make the trade-off between efficiency and responsiveness.

Information is considered as the sixth resource. The other five being men, machines, materials, money and methods. Figure 1 illustrates the flow of information in a production organization along with other resources (Gupta, A.K., 2006, p. 29).
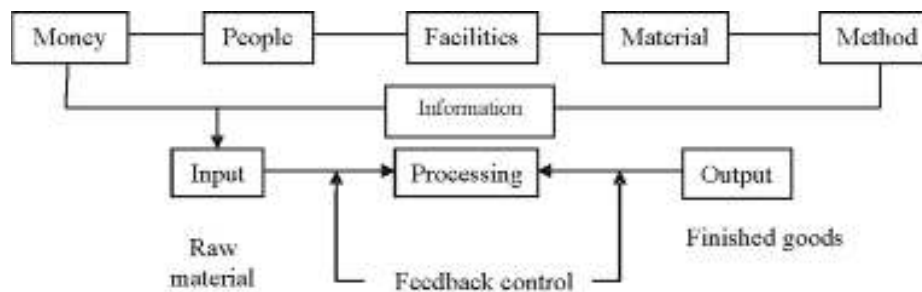

Fig. 1 - Information as a Resource

3.1. Information

Generally information is defined as:
- Knowledge communicated or received concerning a particular fact or circumstance e.g. information concerning a crime.
- Knowledge gained through study, communication, research etc.
- The act or fact of informing.

According to World English Dictionary information is defined as.
- Knowledge acquired through experience or study.
- Knowledge of specific and timely events or situations e.g. news.

3.1.1. Information flow

Information flow is the graphical representation of data collection, data processing and report distribution throughout an organization. In the developing country like Bangladesh, the information flow between various departments within an organization is paper based as shown in figure 2.
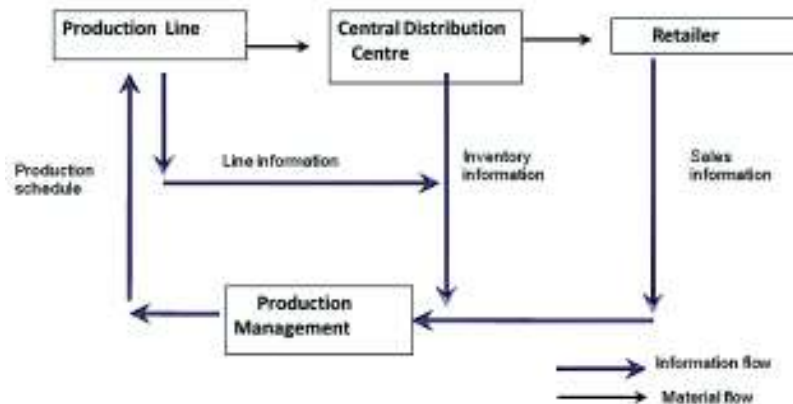
*Fig. 2 - Information and material flow chart
for apparel manufacturing*

3.1.2. Information systems

Beynon-Davies (2009, pp. 92-103) defines an information system as an example of a <u>system</u> concerned with the manipulation of <u>signs</u>. An information system is a type of socio-technical system. An information system is a mediating construct between actions and technology.

An information system can also be considered a semi-formal language which supports human <u>decision making</u> and action. Information systems are the primary focus of study for the <u>information systems discipline</u> and for <u>organizational informatics</u> (Beynon-Davies, P., 2009, pp. 92-103).

The types of information systems are data warehouses, enterprise resource planning, enterprise systems, expert systems and global information system.

3.1.3. Information technology

Information Technology refers to an entire industry. IT is based on using computers and software to manage information. It performs complex functions required to supply information to various departments.

3.1.4. Importance of information technology

Information technology is used for storing, protecting, processing, securing, transmitting, receiving and retrieving information. In business

establishments information technology is used for solving mathematical and logical problems. Information technology helps in project management system. Firstly, planning is done then the data is collected, sorted and processed and finally results are generated. It helps managers and workers to investigations about a particular problem, conceive its complexity and generate new products and services. Thereby improving their productivity and output.

Information technology is important because it is used in everyday life to make things simpler to do. Information technology professionals make difficult tasks easier to do and manage.
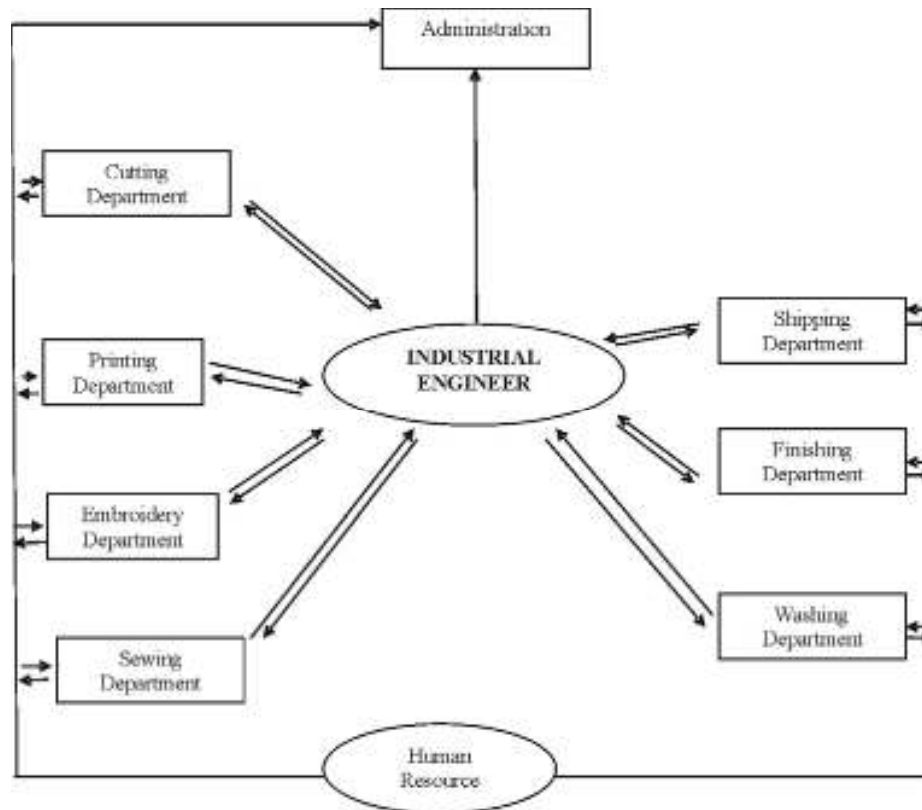
3.2. Existing information flow model

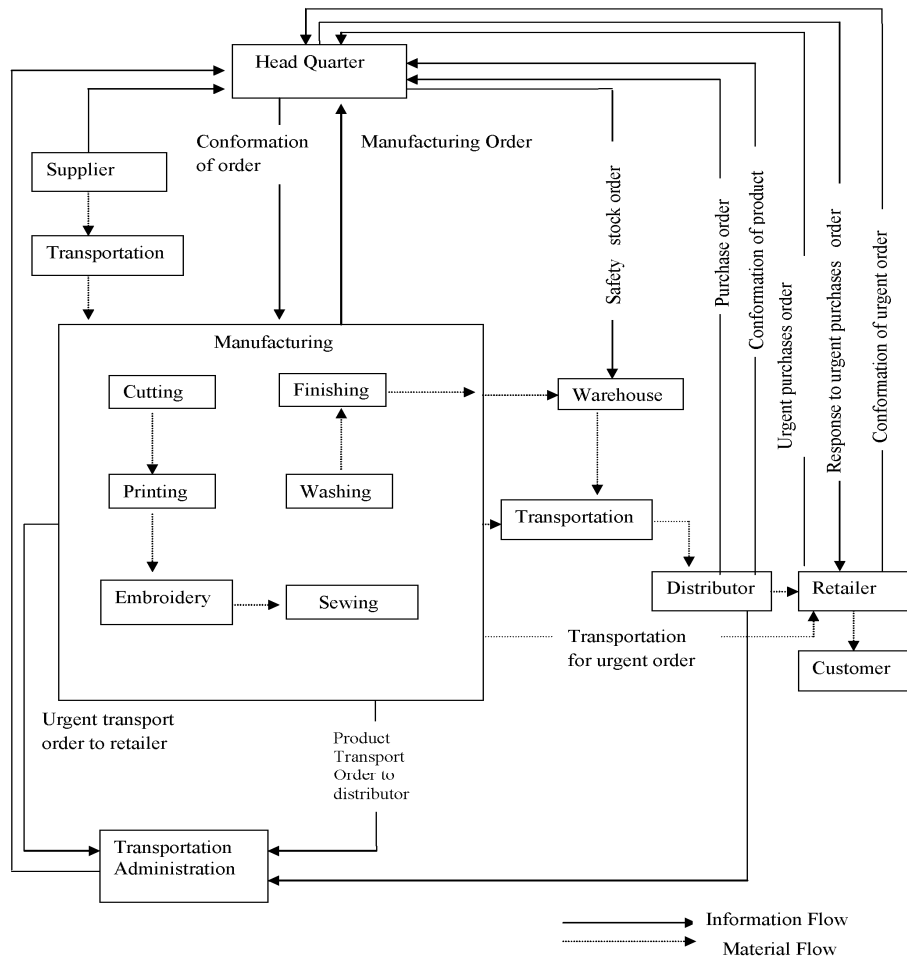*Fig. 3 - Existing Information Flow Model of the studied Industry*

4. Research methodology

The step of research methodology is represented below:

1. Identify scope of the research - Scope of work and study related to theories of production was identified.

2. Gather necessary data and user requirement - Data was gathered by interviewing and documentation to find causes of problems. A case study was performed to design the new system for solving the problems. Data analysis was done to design new system.

3. Design new system

Diagram labels:

Head Quarter

Supplier — Transportation

Conformation of order — Manufacturing Order

Safety stock order — Purchase order — Conformation of product — Urgent purchases order — Response to urgent purchases order — Conformation of urgent order

Manufacturing:
Cutting → Printing → Embroidery → Sewing
Finishing, Washing
Warehouse
Transportation

Distributor — Retailer — Customer

Transportation for urgent order

Urgent transport order to retailer

Product Transport Order to distributor

Transportation Administration

Information Flow
Material Flow

4. Develop the software - The software was developed by using XAMPP for Windows Version 1.4.16, which includes MySQL version 4.1.14 to create database and PHP version 5.0.5 as a program tool.

5. Testing and debugging each module - The software was tested as a prototype in the studied apparel industry in December, 2010.

5. Organization of software

In the apparel Industry, the administrative internal organizations have been cooperated between departments as following- Human Resource Department, Marketing Department, Financial Department, Purchasing Department, Store Department, Research and Development Department and Production Department. Production Department consists of Cutting, Printing, Embroidery, Sewing, Washing, Finishing and Shipping etc.

In the current production process, information flow, related document and interview related departments are as following.

5.1. Cutting department

Cutting department is responsible for cutting process.. They start from receiving order from customer. They needs to keep data about order quantity, cutting percentage, balanced quantity, cutting quantity, completed quantity, sending quantity, sending time and provide these data to administrative department.

5.2. Printing department

Printing department is responsible for printing process. They starts from receiving data and raw material from cutting department .They needs to keep data about sending quantity, sending date, factory name, received quantity, received date, balanced quantity and provide these data to administrative department.

5.3. Embroidery department

Embroidery department is responsible for Embroidery process. They start from receiving data and raw material from printing department. They needs to keep data about sending quantity, sending date, and factory name, received quantity, received date, balanced quantity and provide these data to administrative department.

5.4. Sewing department

Sewing department is responsible for sewing process. They start from receiving data and raw material from embroidery department. They needs to keep data about input quantity, output quantity, balanced quantity, and provide these data to administrative department.

5.5. Washing department

Washing department is responsible for washing process. They starts from receiving data and raw material from Sewing Department .They needs to keep data about sending quantity, sending date, factory name, received quantity, received date, balanced quantity and provide these data to administrative department.

5.6. Finishing department

Finishing department is responsible for finishing process. They starts from receiving data and raw material from washing department .They needs to keep data about packaged quantity, poly quantity, balanced poly, complete quantity, data update time and provide these data to administrative department.

5.7. Shipping department

Shipping department is responsible for shipping process. They start from receiving data and raw material from finishing department. They needs to keep data ship quantity, shipping date, cut short quantity, order short quantity and provide these data to administrative department.

6. Application software (FIS) overview

An important task for the purpose of information flow and storage is to create database. A database plays an important role for information storage. To implement FACTORY information system application software and a database system was developed. During software development one thing is very important to us that software should be flexible in use and to be simple to suit existing communication system. Figure 5, 6 and 7 shows layout of software. Due to the page limitation details software could not be described. Software is developed with the help of PHP and it is linked with MYSQL (XAMPP, a combination of) PHP and MYSQL) for the purpose of data

storage. The new system will help to share information among various departments such as cutting, printing, embroidery, and sewing, washing, finishing and shipping. The program will show necessary information in planning process for each department functions. The developed new system is composed by two sections that are design database and functions of programs or user interfaces design. The button given below the company name shows information related to the particular department. After clicking any particular type of department the top management can see all information available in the database as shown in figure 6. The top management retrieves the required data from the database. The top management can print all information or any particular information with respect to that database. The particular department can add, remove or update this database with particular information as shown in figure 7. The new system has multi-level password controls so that different` functions have different access levels controlled by their respective authorized people as shown in figure 1.

A snapshot of the factory information system (FIS) is given below:
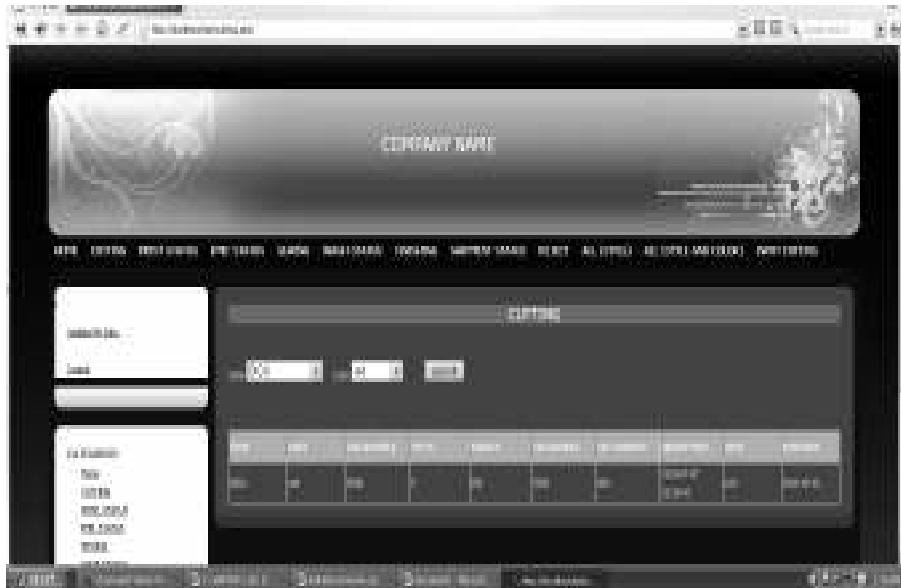

Fig. 5 - Application software overview (01)

Fig. 6 - Application software overview (02)

Fig. 7 - Application software overview (03)

Research equipments and tools

    Hardware- CPU: Intel Pentium Processor IV
    RAM: 128 MB
    Hard disk: 20 GB
    Peripherals: Monitor, Keyboard, Mouse, Diskette and CD ROM Drive.
    Operating system: Microsoft Windows
    Design tool: Dream Weaver Mx 8.0
    Development tool: XAMPP for Windows Version 1.4.16.

7. Conclusion

A windows-based application software tool related to the Factory Information System has been developed. Using this tool management of an industry, an entity can recognize the different activities and information of its various production department. Considering all the observations it is significant that this tool can play a vital role in any industry.

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