



LAHDEN AMMATTIKORKEAKOULU
Lahti University of Applied Sciences

THE DELIVERABILITY OF THE BIT PROGRAMME AT LAHTI UAS IN TRAINING BIT EXPERTS

LAHTI UNIVERSITY OF APPLIED
SCIENCES
Degree programme in
Business Information Technology
Bachelor's Thesis
Autumn 2014
Nghiem, Duc Long

Lahti University of Applied Sciences
Degree Programme in Business Information Technology

NGHIEM, DUC LONG

The Deliverability of the BIT Programme
at Lahti UAS in Training BIT Experts

Bachelor's Thesis in Business Information Technology, 57 pages, 3 pages of
appendices

Autumn 2014

ABSTRACT

Information Technology has become a vital and indispensable part of business in every industry. In fact, IT is the primary factor that differentiates many businesses from their competitors. Organizations usually rely on IT for several strategic business solutions such as communication, information management, customer relationship management, and marketing. In the near future, the business labor force will anticipate a rising demand in BIT experts who possess both business expertise and IT skills.

The Degree Programmes in Business Information Technology at Lahti University of Applied Sciences is constructed to develop BIT experts with versatile competences to satisfy such demand.

The objective of this study is to find out if the graduates of the BIT programme at Lahti UAS have enough knowledge and skills to work as BIT experts in modern business environments. The nature of this study is experimental understanding and exploratory research, thus, the qualitative research method together with a deductive approach has been utilized in this thesis.

The research framework of this thesis is comprised of six parts. First, this thesis starts with the introduction of the programme objective which is training BIT experts with versatile expertise. Second, the demand of real working life on such BIT experts is explained. Third, the thesis investigates the real life skills and knowledge required for a BIT expert to work in modern business environments. Fourth, specific skills provided by the BIT programme are examined and compared with the real life skills to draw the theoretical conclusion. Fifth, the interviews with the Head of the programme, four programme graduates and one business representative are analyzed to point out the empirical conclusion. Finally the theoretical conclusion and the empirical conclusion are combined to answer the research question and draw the final conclusion.

Key words: Business Information Technology, Lahti University of Applied Sciences, BIT experts, modern business environments

CONTENTS

1	INTRODUCTION	1
1.1	Background	1
1.2	Research objectives	2
1.3	Thesis structure	4
2	RESEARCH APPROACH	5
2.1	Research Problem and Research Question	5
2.2	Qualitative vs. Quantitative	5
2.3	Inductive vs. Deductive	7
2.4	Research framework	8
2.5	Data collection and data analysis	9
3	FROM BUSINESS PRESSURE TO INFORMATION TECHNOLOGY SUPPORT	11
3.1	Modern business operations	11
3.1.1	Functional structure of an organization in modern businesses	11
3.1.2	Business processes overview	13
3.1.3	Key business processes in an organization	15
3.2	Information systems overview	19
3.2.1	Information Technology in organizations	19
3.2.2	The impacts of information systems on modern businesses	24
3.2.3	Digital Technologies and Internet of Things	26
4	THE BIT PROGRAMME IN LAHTI UNIVERSITY OF APPLIED SCIENCES	28
4.1	Basic studies	28
4.1.1	Content and objectives of basic ICT studies	28
4.1.2	Content and objectives of basic business studies	30
4.2	Professional studies	32
4.3	Research, development and innovation studies	36
4.4	Elective studies	36
4.5	Skills provided by the programme vs. skills needed by real BIT experts	36
5	INTERVIEWEES OVERVIEW	37
5.1	The head of the programme BIT, Lahti University of Applied Sciences	37
5.2	Graduates of the BIT programme, Lahti University of	

	Applied Sciences	38
5.2.1	Interviewee A	38
5.2.2	Interviewee B	39
5.2.3	Interviewee C	39
5.2.4	Interviewee D	39
5.3	Business representative - Interviewee E	40
6	INTERVIEW ANALYSIS	41
6.1	The head of the programme BIT, Lahti University of Applied Sciences	41
6.1.1	The regular development of the BIT programme	41
6.1.2	The objectives of each group of studies in the BIT programme	42
6.1.3	Suggestions and expectations from the Head of the programme	43
6.2	Graduates of the BIT programme, Lahti University of Applied Sciences	46
6.3	Business representative	49
7	CONCLUSIONS	51
7.1	Summary	51
7.2	Answering the Research Question	52
7.3	Limitation	52
	PUBLISHED REFERENCES	53
	ELECTRONIC REFERENCES	54
	ORAL REFERENCES	57
	APPENDICES	58

LIST OF FIGURES

FIGURE 1. Thesis structure	4
FIGURE 2. Inductive research approach	7
FIGURE 3. Deductive research approach	7
FIGURE 4. Research framework	8
FIGURE 5. A generic business process	14
FIGURE 6. A procurement process	15
FIGURE 7. A production process	16
FIGURE 8. A fulfillment process	18
FIGURE 9. The major business pressures	21
FIGURE 10. Major areas of IT support for BPR	23
FIGURE 11. Checking products in the warehouse process	33
FIGURE 12. Example of transforming an ER model to a database specification	34

LIST OF TABLES

TABLE 1. Changes on Business Processes Brought by IT	23
TABLE 2. Major capabilities of Information Systems	25

1 INTRODUCTION

1.1 Background

This study was conducted in 2014 when the author had completed all the studies, projects and trainings for the bachelor's degree programme in Business Information Technology (BIT) at Lahti University of Applied Sciences (Lahti UAS). The satisfying study experience gained during the previous four years mixed with the high interest in the programme motivated the author to write this final thesis about the bachelor's programme.

Information technology (IT) is a relatively modern phenomenon that has become a vital and indispensable part of business in every industry. In fact, IT is the primary factor that differentiates many businesses from their competitors. Organizations usually rely on IT for several strategic business solutions such as communication, information management, customer relationship management, and marketing. In the near future, the business labor force will anticipate the rising demand in experts with both business expertise and IT skills. Therefore, Degree Programmes in Business Information Technology were constructed and introduced in several universities in order to develop specialists with versatile competences to satisfy such demand.

The bachelor's degree programmes in BIT were introduced in many universities in different developed countries such as the United Kingdom, Finland, Germany, and the United States. These BIT programmes are different from each other concerning both contents and objectives, however they do share several typical features in common. In general, BIT programmes provide students with theoretical and practical knowledge in the field of information technology, as well as essential skills needed for daily business operations. In addition, students also have chances to be familiar with modern technologies while studying in interactive business environments. Graduates are expected to take several positions in a team or company providing IT solutions for businesses. Career opportunities are, for example, software designer, web developer, system analyst, IT project manager.

This study focuses on exploring the BIT programme provided by Lahti UAS to understand how it reflects the real life work demands. Like other BIT programmes, the BIT at Lahti UAS provides students chances to be familiar with general working knowledge and skills as well as expertise in both business and IT fields. According to the BIT study guide for the school year 2013-2014, the general skills necessary for working in a business environment include communication and operation skills, analytical and critical thinking, research and development skills, entrepreneurial thinking, learning skills and self-efficacy. While BIT specific competencies consist of business competence, business application software competence, information system knowledge, ICT (Information and Communication Technologies) infrastructure competence as well as ICT project competence. (LAMK 2013)

The BIT programme provided by Lahti UAS especially focuses on the field of information systems. Several courses and projects with real business tasks are arranged to equip students with the professional skills for designing, acquiring, building, using, developing and managing information systems. In conclusion, the programme emphasizes the vital role of IT for the growth and competitive advance of any business, while information systems management is the key point.

“The programme places a high priority on meeting the needs of software development and information systems management in a networked business environment. Special focus is placed on graphical software and user interface design and also on the use of object and component technologies.” (LAMK 2013)

1.2 Research objectives

This thesis aims to clarify whether the graduates from the BIT programme at Lahti UAS have the skills to work as BIT experts in modern business environments. The study is expected to benefit three main groups of audience: the people who consider studying the BIT programme at Lahti UAS for a bachelor’s degree, the students who are studying this programme and the lecturers from this programme.

As mentioned above, the first group consists of people considering the BIT programme at Lahti UAS as an option for their certificates at graduate level.

These are usually students recently graduated from high school, thus looking for a place for studying business and related subjects. Then they found out about the BIT programme at Lahti UAS, got interested but were yet to make any decisions due to the ambiguity concerning the programme. People in this group can also be other university students who consider switching to study the BIT programme in Lahti UAS but still need more in depth details about this programme, or anyone who are looking for information about the BIT programme in Lahti UAS before making an application to study. In brief, most of the people in this group have not gained any working experience in business, while working life is becoming more and more complicated, they face many difficulties making final decisions on which subject to study for bachelor. They have the same question: “what is BIT and how it suits them?” The author has compiled a study about the BIT programme at Lahti UAS to introduce the programme, clarifying the content and objectives of BIT to help these people determine their bachelor’s degree selection.

The second group includes the students currently taking part in the BIT programme at Lahti UAS. During the studying time, it was brought to the author’s attention that many of his fellow students did not have clear visions about what the programme had to offer them. In other words, they attended courses with vague ideas about the objectives of these courses, how these courses are related to the real business work. Or they did not even have much thinking about which skills they needed to focus on or what knowledge they needed to learn carefully for their own future careers. This ambiguity discouraged them to take the courses seriously, especially the professional ones. All these problems were observed or experienced by the author himself, they partly motivated the author to write this thesis. With the clarification of the overall objective of the programme, together with the explanations of the crucial courses, this thesis is expected to provide the students with in depth information about the competences the programme aims to equip them with. So that the current students can better determine their career aims and decide which fields they want to focus on to achieve those aims. With a clearer picture in mind, they would also be more motivated and engaging to the study, thus they can gain most benefits from the programme. Besides, since this thesis also includes interviews of the programme head teacher, the students have

opportunities to know how much the teacher expect from them and the courses' views from a lecturer's perspective.

The last group of audience includes the lecturers teaching in the BIT programme at Lahti UAS. This thesis may interest them as they can get to know what students thought and experienced during the programme, thus, better understanding their students.

Therefore, the author with the support of the Head of the programme decided to examine the content of the BIT programme further as well as investigate the work the students have after graduation.

1.3 Thesis structure

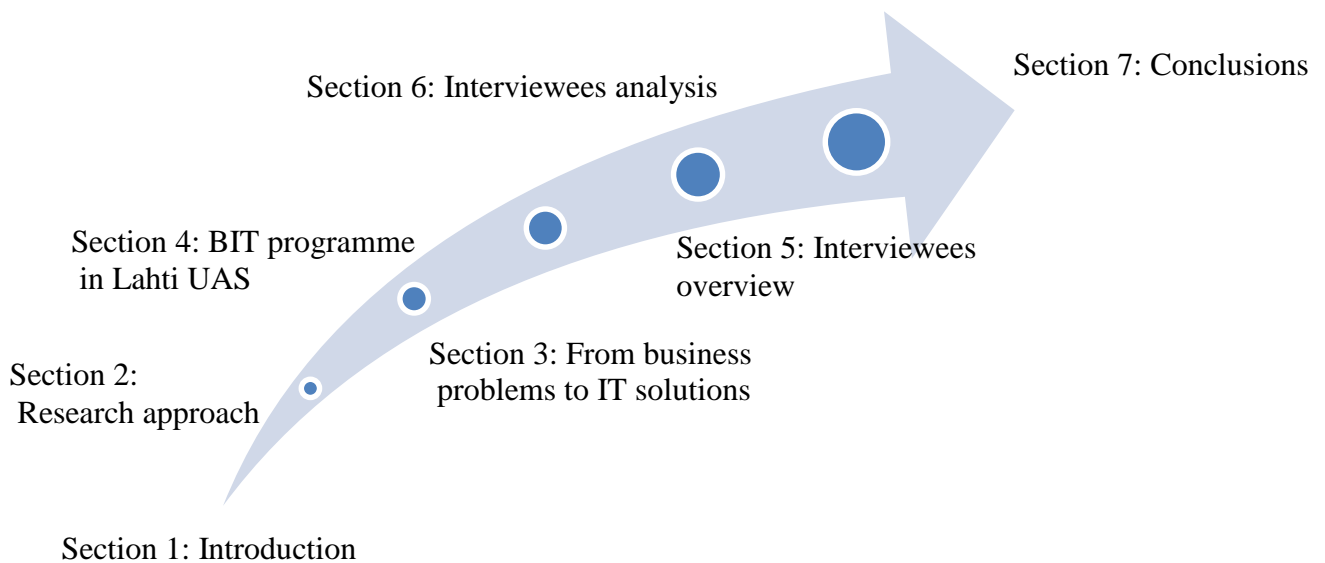


FIGURE 1. Thesis structure

2 RESEARCH APPROACH

In this section, the research problem is introduced, the research question is stated, the selection of qualitative research method is explained, the selection of deductive approach is clarified and finally the research framework is conducted.

2.1 Research Problem and Research Question

This thesis analyzes the modern business environments as well as modern organization structure to emphasize the demand of a particular group of experts - the BIT experts. These experts possess both business and IT competences that they can be the connection between businessmen and IT specialists. They understand and be able to work with information systems confidently. The final goal of this thesis is to conclude whether the BIT programme at Lahti UAS succeed in training such BIT experts.

In order to carry out conclusions, the following steps were conducted. Firstly, this thesis explored the specific skills introduced by the programme, then comparing them with the practical skills needed for BIT experts. Secondly, practical assignments and real life oriented projects were inspected to clarify how effective students obtained the skills. Finally, interviews are conducted to provide practical evidences for the results of training qualified BIT experts in modern business environments.

The following research question is used for identifying the research problem: Do the students graduated from the BIT programme at Lahti UAS possess the professional knowledge and skills to work as BIT experts in modern business environments?

2.2 Qualitative vs. Quantitative

“Not everything that can be counted counts and not everything that counts can be counted” (Albert Einstein).

First of all, what are qualitative research methods and quantitative research methods? What distinguishes them from each other? Qualitative research methods

were developed to meet the need of research in social sciences. Qualitative research is defined as a set of research methods to examine the social and cultural contexts through interviews, focus group discussions, observation or content analysis (Hennink, 2011). In more details, by doing qualitative research, the researchers are engaged in the context in which everything that matters takes place. Therefore, the researchers are allowed to identify the problems from the perspective of the participants, for example by in-depth open-ended interviews, direct fieldwork observations, and written documents. (Myers, 2009)

On the other hand, quantitative research methods were favored in natural sciences as they tend to find out the measurement or frequency of the phenomena, in other words, these methods emphasize numbers than anything else (Rowlands, 2005). In quantitative research methods, theories and concepts are drawn by numbers, thus numbers are the evidences of how everything works. Moreover, statistical tools are usually required to analyze the data to conduct conclusions. (Myers, 2009)

Both kinds of research are important and usually only one of them is relevant and suitable for one specific research case. Particularly, qualitative research was chosen as the research approach to this thesis' problem. There were two reasons for this decision. First, according to Myers (2009) "*qualitative research is best if you want to study a particular subject in depth*" and "*quantitative research is best if you want to have a large sample size and you want to generalize to a large population*". This thesis focused on providing in-depth understanding of a unique Bachelor's degree programme, which is the BIT programme at Lahti UAS. Also, using a large sample size as well as generalizing to a large population was not considered in this thesis, therefore, qualitative research seemed to be the appropriate approach for this problem. Then, this thesis had another factor which meets the characteristic of qualitative research. That was the thesis's research problem was new, thus not published researched and the result of this study was expected to be suitable only for the specified context. While the trends and patterned drawn from quantitative research methods are usually applied in different situations. Besides, while using qualitative research, the author could use his own experience and observations as the data for drawing conclusions.

2.3 Inductive vs. Deductive

First of all, let us examine the meaning of inductive research approach, deductive research approach and their differences.

According to Goddard and Melville (2004), in the inductive approach, a theory is constructed at the end of the research.

"Inductive approach starts with the observations and theories are formulated towards the end of the research and as a result of observations." (Goddard, W. & Melville, S., 2004)

In order to form a final theory, specific observations and patterns are studied, while no theories are applied at the beginning of the research. The whole inductive approach can be summarized by the following model.

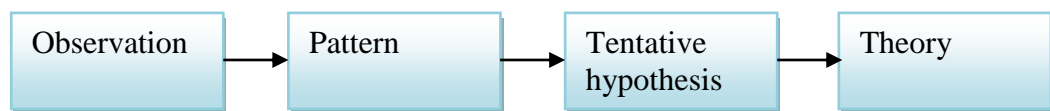


FIGURE 2. Inductive research approach (Burney, 2008)

On the other hand, "*deductive approach is concerned with deducing conclusions from premises or proposition.*" (Babbie, 2010). Hypotheses are formed at the beginning of the research, they will be tested and proven right or wrong at the end. Burney (2008) illustrated the deductive research approach by the following model.

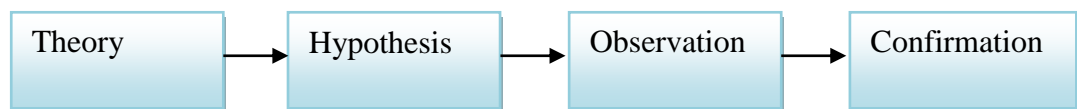


FIGURE 3. Deductive research approach (Burney, 2008)

Deductive approach was utilized by this thesis. The author started with the theory that the students graduated from the BIT programme at Lahti UAS possess expertise to work as several IT positions, especially those related to information systems. Then the programme content, the author's own observation and the interviewees who graduated from this programme were examined to conclude whether the theory was right.

2.4 Research framework

A research framework is a collection of interrelated concepts and their links which are used to draw the logical overall picture of a research. The framework helps the researcher determine what aspects to cover, create hypotheses and narrow the research questions. (Borgatti, 1999)

First, this thesis started with the introduction of the programme objective which was training BIT experts with multiple expertise. Second, the demand of the real working life on such BIT experts was explained. Third, the thesis investigated the real life skills and knowledge required for a BIT expert to work in modern business environments. Fourth, specific skills provided by the BIT programme were examined and compared with the real life skills to draw the theoretical conclusion. Fifth, interview analysis was conducted to point out the empirical conclusion. Finally the theoretical conclusion and the empirical conclusion were combined to answer the research question and draw the final conclusion.

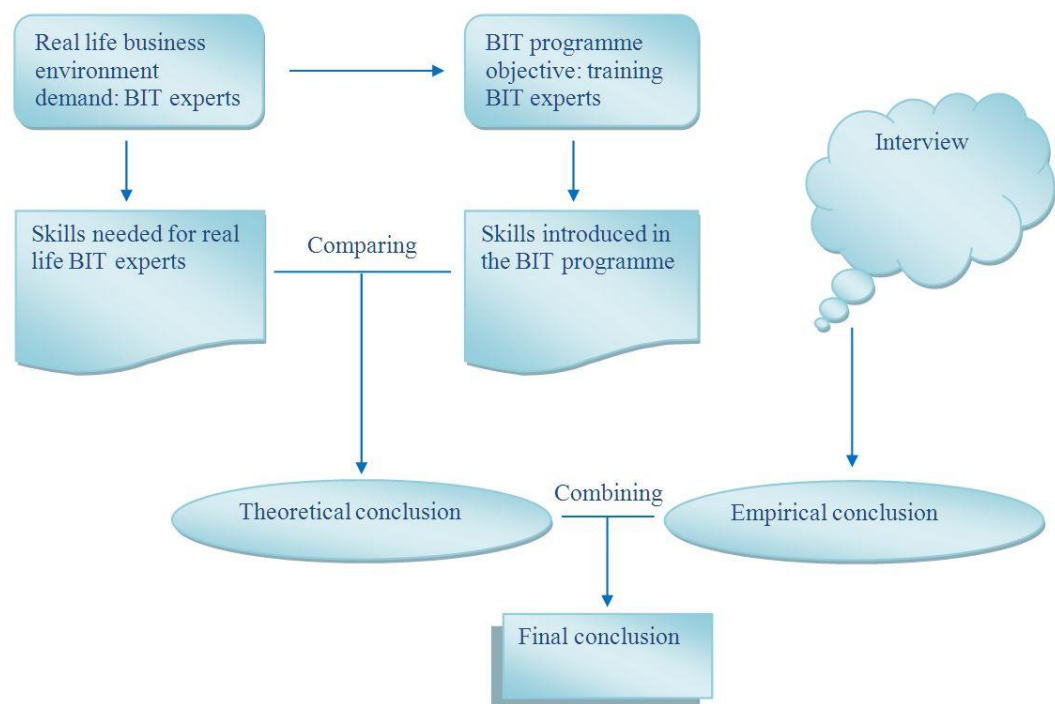


FIGURE 4. Research framework

2.5 Data collection and data analysis

There were two types of data to be collected and analyzed in this thesis, the theoretical data and the empirical data.

The theoretical data about the modern business, modern organizational structures and the role of IT is collected from secondary sources such as electronic sources, books, articles and especially all the BIT courses documents which were saved by the author, as the author was a student of this programme. The BIT courses documents are the materials from the lecturers, the assignments and the written notes kept by the author.

The empirical data was collected by interviewing and by recalling the author's own observation. Open-ended interviews were prepared and the interviewees were divided into 3 categories. The first category contained students who were graduated from the BIT programme at Lahti UAS. By interviewing these students, the author could draw a picture about what they had expected about the BIT programme before they actually participated in it, and how useful the skills learned from the programme were for their practical trainings and their current work. While the second category contained the BIT head programme lecturer providing the author the opinions on how the professional courses could support students in their working life later on, as well as what students were expected to perform during their studies. The third category includes 1 business representative to provide the opinions on the crucial link between IT and business from a businessman perspective.

The data analysis, which is qualitative data analysis in this case, aims to uncover the big picture by describing the phenomenon using the data collected. In other words, the analysis process includes procedures to conduct explanation, understanding or interpretation of the problems or people that need to be investigated. As the data consist of words and observations, not numbers, the analysis process requires creativity and a systematic approach. (Taylor-Powell, E. & Renner, M., 2003)

In this thesis, the collected secondary data about the real world BIT skills were compared with the data collected from author's observations and programme's materials. This comparison seek the answers to the research question, whether the graduates possess the BIT skills. Then the empirical data collected from the interviewees was analyzed to become evidences that support the thesis conclusion.

3 FROM BUSINESS PRESSURE TO INFORMATION TECHNOLOGY SUPPORT

3.1 Modern business operations

3.1.1 Functional structure of an organization in modern businesses

First of all, we need to get the overall image about business operations. The most common type of organizational structure is functional structure, especially in large organizations.

“The functional organizational structure organizes the activities of a business around areas of specialization.” (Bragg, 2013)

In a functional structured company, employees are specialized based on their roles and grouped into departments. Each of the departments deals with a specific set of activities. For example, the marketing department is responsible only for marketing activities, while the accounting department focuses only on sending and receiving payments.

In fact, large companies, which deal with large sales and production, do not have any other structure that would be as suitable for them as the functional organizational structure. According to Bragg, this structure has the following advantages.

First, operational efficiencies and high productivity level are easier to be achieved when a group of employees are put together to solve a specific functional problem. These employees usually share similar skills and knowledge, and by this structure, they are allowed to work and focus on the tasks for which they are the best. In other work, they are the experts in a specific functional area, they can perform the work quickly, effectively and confidently.

Second, the functional structure provides a very clear career path with a stated goal in each functional unit. For each employee, it is easy to compare his

achievements with his objectives in a functional area, therefore, the employees are directed and motivated to work harder for promotion.

Last, new employees are chosen and trained easier because of the specialized nature of this structure. Since each department contains a group of specialists having similar skills and knowledge, it is easier for the experienced employees to share their expertise with the subordinates. In the other hand, the subordinates can always offer their managers with helpful skills and ideas.

While specialized functional departments usually work very efficiently on their own, they often have difficulties cooperating with each other. This seems to be the most common and serious problem of a company following this structure. There are many integrated business processes that involved several unrelated departments. These processes are called cross-functional processes which require a high level of teamwork throughout all the functional units involved. This has always been a difficult objective to fulfill as most of the employees lack of knowledge about the work from other functions. In more details, these employees usually see only the goal specified for their own department, they neglect each other and eventually become unwilling to cooperate or even competing with each other. The big picture, the company's overall objectives are, thus, left behind. For example, the IT department may get upset after its request for an information system update was denied, without noticing that the company had better invest on new products instead.

This problem is usually referred as the silo effect: "*Workers complete their tasks in their functional silos without regard to the consequences for the other components in the process*" (Simha R. Magal, Jeffrey Word, 2012). Moreover, as the company grows larger and larger, its departments become larger and more independent, too. They can even develop their own cultures, rules and become more like small companies on their own, thus, very difficult to manage.

To overcome this situation, each company should have employees with versatile skills to be able to accomplish a cross-functional process as a whole. These employees should have the ability to connect other employees from isolated departments, remind them to focus on the objectives of the process rather than

each functional goal. In addition, there must be also information systems experts in place to ensure that the flow of information is as smooth as possible.

Consequently, these skills have become more and more crucial and demanding for any companies following functional organizational structure.

Training such multitasking employees or information systems experts is the main objective of the BIT programme in Lahti UAS. Through professional courses with real business tasks, the programme equips students with knowledge and skills from both business and IT fields. A graduate is expected to become a multitasking employee who acts as a link between employees from different departments, especially between the businessmen and the IT experts as they usually do not understand each other. Besides, there are several career paths for a student after studying the BIT programme at Lahti UAS so that he or she can choose to become professional in a specific area instead. More details about how the programme provides such skills for students will be discussed in later part of this thesis.

3.1.2 Business processes overview

We have just analyzed the modern organizational structure to get the overall picture about the operations of a business. Before going into details about types of business processes, there is another concept worth mentioning, the Enterprise Systems (ES).

Nowadays, business processes usually involve different parts of an organization. Therefore, without an appropriate modern information system, the resources and information cannot be shared effectively, these processes cannot be managed holistically. Especially, when modern business models tend to have processes performed from different locations, the use of information systems decides how well these processes can be managed. An ES is one kind of information systems, ES is especially constructed to fully execute and manage a whole process, as well as to integrate and coordinate all the processes throughout an organization.

Now we analyze the most popular processes, the key ones that almost occur in any organizations. Let us start with some definitions of “business processes”.

According to Margaret Rouse, “A *business process* is an activity or set of

activities that will accomplish a specific organizational goal” (Rouse, 2005).

While the definition of business process from a group of authors on website Appian focuses on services and products with inputs and 1 output, “A *business process is a collection of linked tasks which find their end in the delivery of a service or product to a client. The process must involve clearly defined inputs and a single output.*” Moreover, Magal and Word (2012), in their book, noted that a process is always triggered by some event. Figure 5 illustrates the complete picture of a general business process.

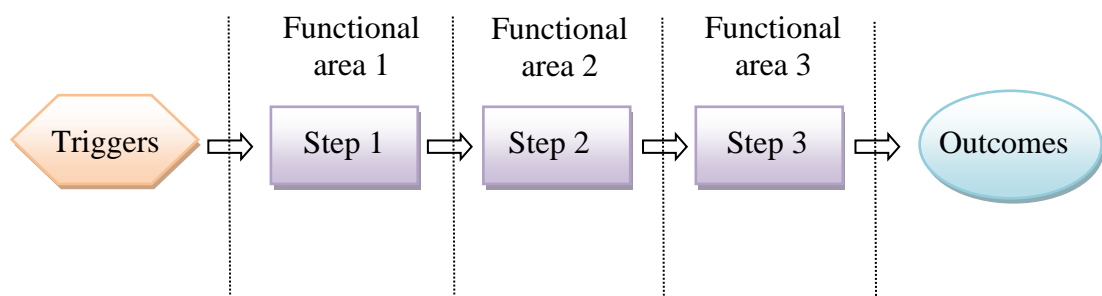


FIGURE 5. A generic business process (Simha R. Magal, Jeffrey Word, 2012)

Although organizations exist for different purposes, they all need to execute processes to run their business. And while processes can vary, depending on the characteristics of the business areas, they do share many similar features in common. In more details, a business process is usually triggered by an event, and then executed step by step by different functional units to finally produce the outcomes. A classic example is that a customer places an order for a product as a trigger, the order is validated by the sales department then sent to the warehouse to prepare and ship the product to the customer, while the invoice and payment are handled by the accounting department. All business processes also require effective cooperation among the involved functional units as well as close coordination among the employees to ensure the smooth execution. (Simha R. Magal, Jeffrey Word, 2012)

There are several key processes in a business operation. Magal and Word (2012) classified these popular processes into 4 groups depending on their relationships with the creation and delivery of a product. We will go into details about these

groups of processes as well as the most 3 important processes in the following part.

3.1.3 Key business processes in an organization

As mentioned above, the key processes in an organization are separated into four groups. The first group includes the top three vital processes which directly connect to the creation and delivery of a product or a service.

The first process in this group is called the Procurement process. This is such a crucial process because it includes all the activities to externally acquire goods and services needed to create the products. Procurement also covers all fundamental activities such as defining the business need, selecting supplier, researching the market or negotiating contracts... Figure 6 illustrate a simple example of procurement process which involves three different departments.

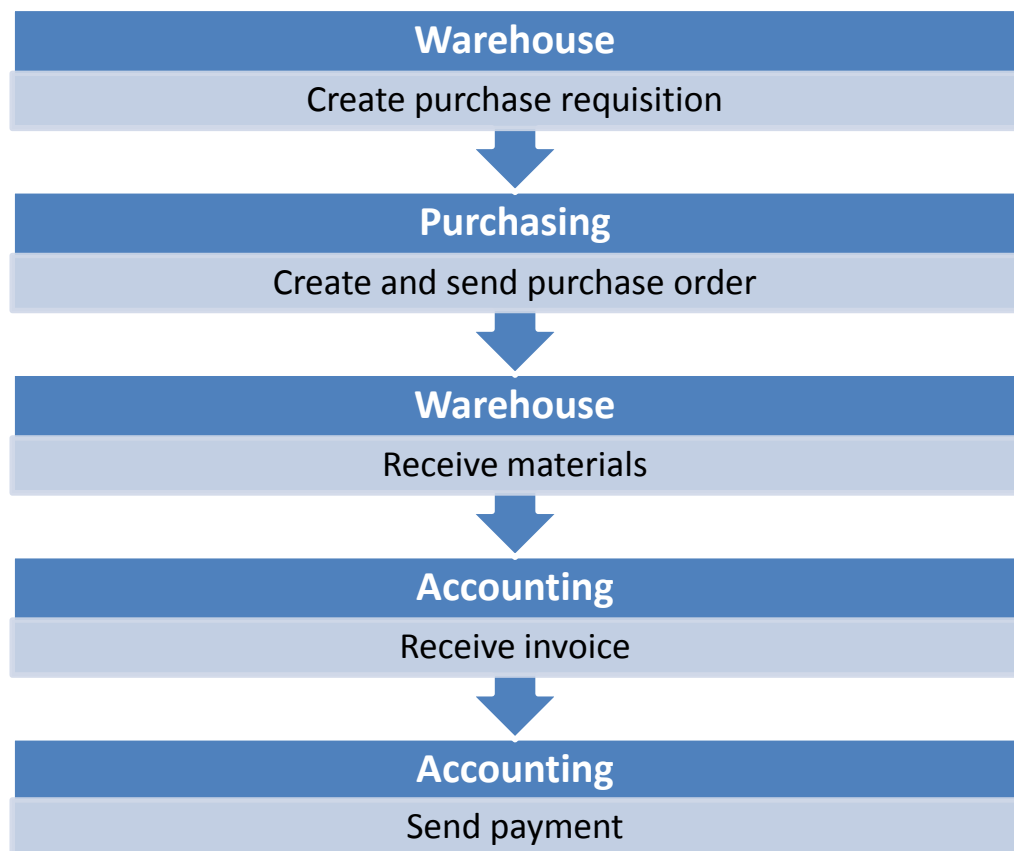


FIGURE 6. A procurement process

For the procurement process to be triggered, there are four different scenarios according omega and Word. The most common event is that when the Warehouse notices the amount of stock in the company's storage is low, it makes a purchase request. Other reasons that trigger the procurement of materials can be to make more products based on a forecast, to have necessary resources to repair previously purchased products, or to fulfill a customer order.

The second process in this group is the Production process. While procurement means acquiring material externally from a vendor, production stands for producing required materials internally. Basically, production is the process of transforming raw materials into a final product. This process can also include treating, machining, or reshaping the materials. (Chegg Inc., 2014) An example of production process between the Warehouse and the production department is showed in Figure 7.

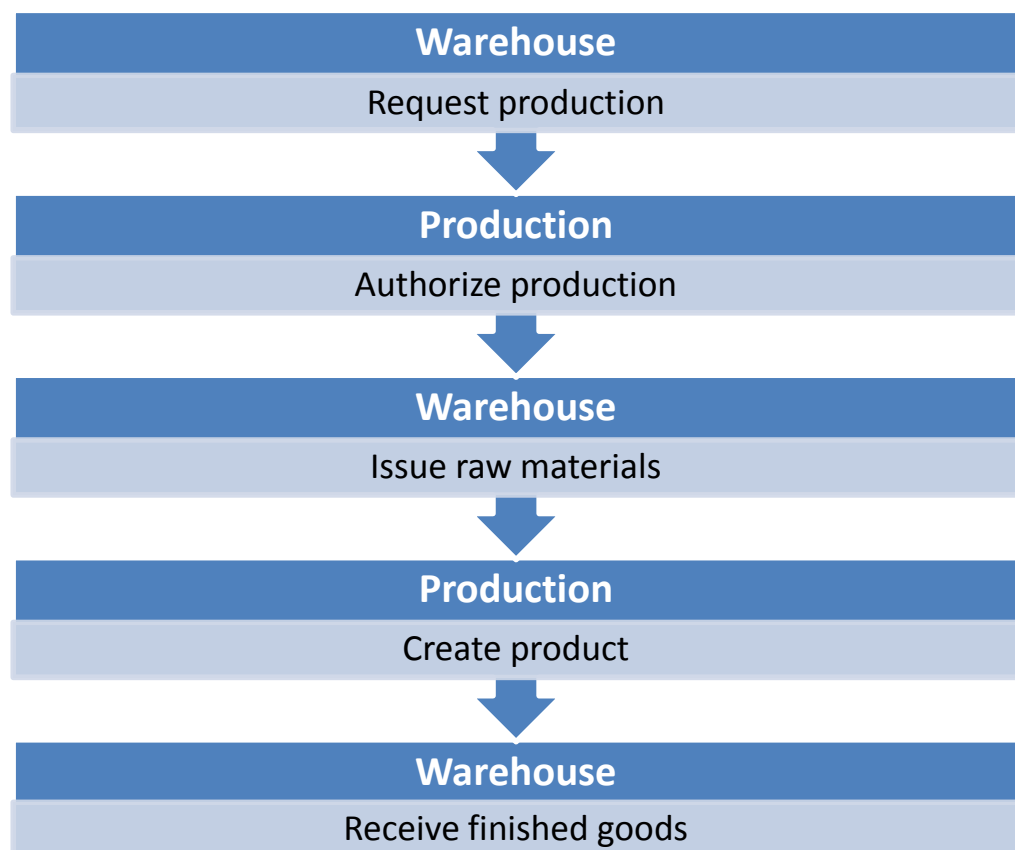


FIGURE 7. A production process

Like the procurement process, the production process can also be triggered by the need of making more products to match a forecasted demand or a customer order. It is worth mentioning that it is common for a process to be triggered by another process, for example, in this case, the decision made by the material planning process can trigger the production, or the final activity of the warehouse from the production process can trigger the Inventory and Warehouse Management process (this IWM process will be discussed in a later part).

The last process of the top three important processes is related to selling, the Fulfillment process. “*Fulfillment is concerned with efficiently processing customer orders*” (Simha R. Magal, Jeffrey Word, 2012). In other words, fulfillment is a complete process from sales request to delivery of a product or service to the customer. This process can include warehousing, finding ordered items, packaging items and shipping them to the right address. Besides, the fulfillment processes differ depending on the business models, for example, for a company in e-commerce industry, fulfillment can also be maintaining online inventories, activating customers’ accounts or managing customer lists... Below is an example of a simplified fulfillment process.

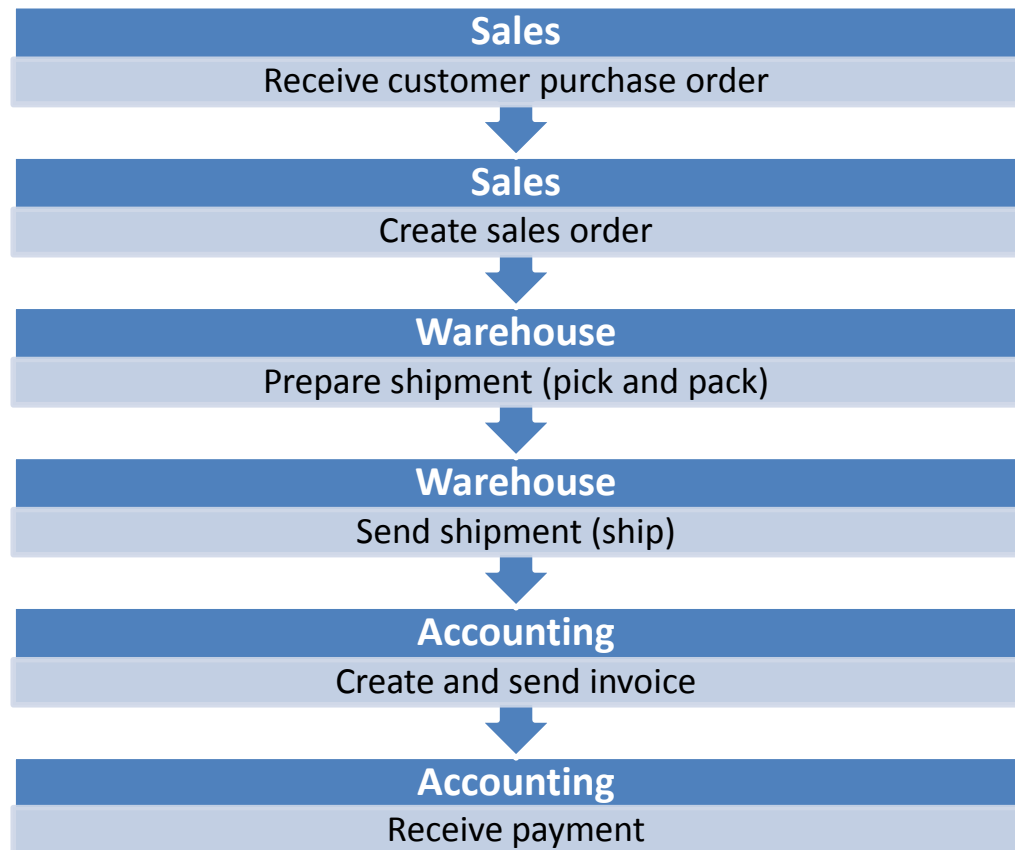


FIGURE 8. A fulfillment process

Again, fulfillment process is a cross functional process which involves 3 departments, according to the example provided by Magal and Word. Also, fulfillment can trigger the Inventory and Warehouse Management process while picking up the products from the storage or even trigger the production process or procurement process in case the products are not available.

The second group consists of 4 crucial processes which are closely related to creating and delivering products. They are implemented to design, plan, store and service products. In more details, the Lifecycle Data Management process is responsible for all the designing ideas of the products from the initial idea to the disruption of the product. Next, to plan about the procurement and production of products, companies perform the Material Planning process. And to store and track the materials, there is the Inventory and Warehouse Management process. Lastly, the Asset Management and Customer Service processes are in place to maintain or repair both products in store and products sent to repair by customers.

Furthermore, the third group contains two supporting processes such as Human Capital Management processes and Project Management processes. One focuses on the staff in the organizations and the other is concerned about planning and executing decisive projects of an organization.

All processes mentioned above are connected to the processes in the fourth group. This group has two processes to track the whole organization's finance. The Financial Accounting processes are used to ensure that the organization's financing meets the legal requirements. While the Management Accounting or Controlling processes are used to manage costs and revenues. (Simha R. Magal, Jeffrey Word, 2012)

3.2 Information systems overview

As explained in the previous part, modern businesses involve many processes, cross functional processes or business activities that require a confident flow of information. Information technology, particularly, information systems (IS) are in place to ensure all the information stored and distributed correctly, in other words, to control the performances of these processes. The importance of information systems for each organization, therefore, cannot be neglected.

3.2.1 Information Technology in organizations

No one would dispute that Information Technology has become the key success factor for organizations in all sectors.

“The major role of information technology is to provide organizations with strategic advantage by facilitating problem solving, increasing productivity and quality, improving customer service, enhancing communication and collaboration, and enabling business process reengineering.” (Turban, E., McLean, E. & Wetherbe, J., 2002)

In fact, IT has been providing organizations with new competitive opportunities. And with the rapid reduction in the cost of information systems, IT does not only provide applications for back-office activities but also systems for interacting with customers, for example, marketing, sales, and services. Or there are even systems

to link customers and supplier together. In many cases, the fast growing technology has offered the opportunity for a company to redistribute its assets and redesign its strategy to improve its position in the market share. (McFarlan, 1984)

Before going any further in to details about the role of IT, information systems and their related skills, we need to understand what IT is, and what skill is. IT is commonly understood as anything to do with computers. More precisely, Information Technology as it was named, concerns storing, processing and outputting information.

"IT is concerned with issues related to advocating for users and meeting their needs within an organization through the selection, creation, application, integration and administration of computing technologies." (Lunt, B. & Ekstrom, J., 2008)

Another definition of IT was given by David Swass. This definition is more business related.

"I define information technology as the products, services, or solutions that are deployed to store, retrieve, transport, or process information in the course of a business unit or end-user accomplishing a goal" (Swass, D., 2006)

Skill, or in this case the IT skill, is a combination of getting the computers or systems do what you want them to do, knowing what they can do and understanding how they do it. (Still, 2001)

Now, in order to understand the importance of IT in organizations, we will analyze the relation between business pressures and the support of IT to response to these pressures. First of all, the term "business pressures" is defined as all the forces in the organization's environment that create pressures on the organizations' operations. They are the environmental, organizational, and technological factors that change quickly and create both problems and opportunities for organizations. Towards these pressures, organizations are expected to perform appropriate response activities which can usually be assisted by IT. (Turban, E., McLean, E. & Wetherbe, J., 2002)

So what brought these business pressures to an organization? Turban, McLean and Wetherbe (2002) explained that any significant change in the social,

technological, legal, economic, physical, or political factor can create pressures on organizations. In the book “Information Technology for Management” (2002), the authors divided business pressures into 3 groups and illustrated them by a graphical view (Figure 9).

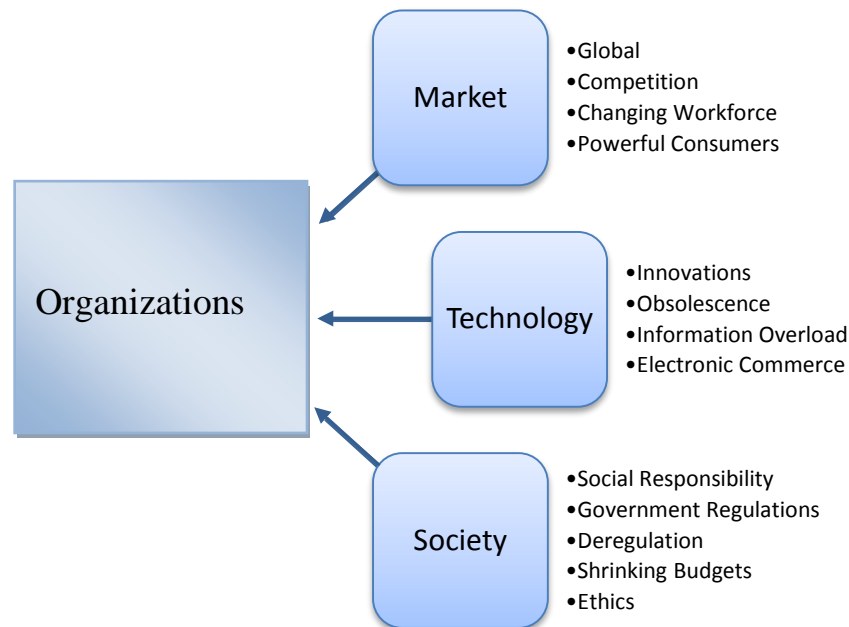


FIGURE 9. The major business pressures

The amount of pressures on organizations are escalating because of the increasingly complex business environments. For instances, the competitions for better communications, transportation, and technology or the activities in politics and economy always generate many changes. And as mentioned above, changes are the main reason creating business pressures. Therefore, in order to be competitive or, in some cases, to survive in this dynamic business world, organizations are expected to respond to the pressures frequently and quickly with the help of IT. (Turban, E., McLean, E. & Wetherbe, J., 2002)

A classic example of critical response activities with the support of IT was the Business Process Reengineering (BPR) approach. First of all, a typical competitive business environment usually creates these 3 pressures on organizations: customers, competition, and change. Customers today are very active in looking for and choosing products; competition is becoming more and more intensive in terms of price, quality, selection, service and promptness of

delivery; and change frequently occurs in an unpredictable manner. Towards these challenges, organizations can have several methods of response, however, many of the traditional responses do not work in this dynamic environment. “Business process reengineering”, an innovative way to redesign business processes, was therefore, constructed to help organizations adapt to environments full of hard pressures.

Business process reengineering refers to a situation in which an organization fundamentally and radically redesigns its business process to achieve dramatic improvement. (Turban, E., McLean, E. & Wetherbe, J., 2002)

The main objective of BPR is to provide the information integration which is extremely critical for decision making. Also, information integration has been becoming more and more difficult to achieve, especially for functional structured organizations which usually have many business activities involving isolated functional departments (part 3.1.1). In brief, the reengineering of business processes has become a common solution for many organizations in today business environments.

Importantly, information technology or particularly the use of information systems is the key to implement a comprehensive BPR. In more details, IS are in place to provide distance business operations, flexibility in manufacturing, quick deliver to customers and rapid, paperless transactions among suppliers, manufacturers and retailers. These supports can be divided into 4 major areas, illustrated by Figure 10.

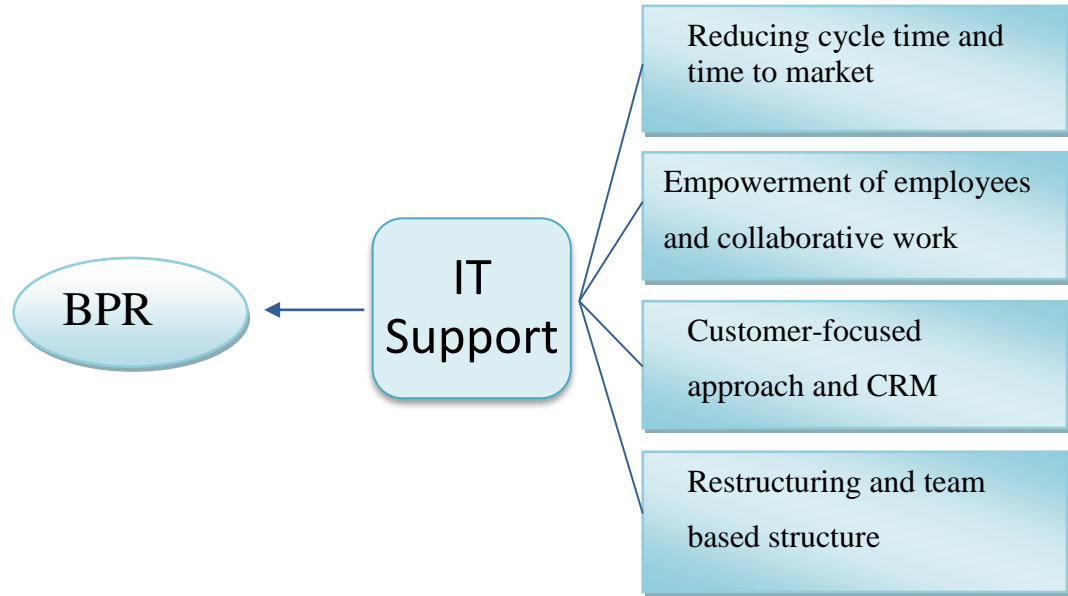


FIGURE 10. Major areas of IT support for BPR

(Hammer, M. & Champy, J., 2006)

IT has been utilized for decades to enhance business processes, especially in terms of productivity and quality. In the book "Re-engineering the Corporation", M. Hammer and J. Champy provided many innovative changes that IT brought into business. These changes are illustrated in Table 1.

TABLE 1. Changes on Business Processes Brought by IT

Old rule	Intervening Technology	New Rule
Information appears in only one place at one time.	Shared databases, client architecture, Internet, intranets	Information appears simultaneously whenever needed.
Field personnel need offices to receive, send, store, and process information.	Wireless communication and portable computers, the Web, electronic mail	Field personnel can manage information from any location

You have to locate items manually.	Tracking technology, groupware, workflow software, search engines	Items are located automatically.
Organizations and processes are information-based.	Artificial intelligence, expert systems	Organizations and processes are knowledge based.
People must come to one place to work together.	Groupware and group support systems, telecommunications, electronic mail, client	People can work together while at different locations.

(Hammer, M. & Champy, J., 2006)

In conclusion, with the support of IT, business processes can be performed much more effectively than before. IT enhances business activities by several tools, technologies, and systems, especially the information systems. It is clear that IS are the key for a competitive advantage in any business. For this reason, the BIT programme at Lahti UAS aims at providing students with competences to design, implement, develop or manage information systems. Students, therefore, have excellent opportunity to become information systems analysts after graduating from this programme. The next part will clarify and emphasize the role of information systems in organizations.

3.2.2 The impacts of information systems on modern businesses

"An information system is an integrated set of components for collecting, storing, and processing data and for delivering information, knowledge, and digital products." (Zwass, 2014)

The main function of an IS is processing input data to produce output information which will be sent to specified users or other systems. A single IS can include many personal computers, printers, devices, communication networks and databases. In other words, most of the information systems are computerized. An

IS also usually includes people who directly use the systems or use its outputs. Moreover, all IS have a purpose and a social context within an environment. These purposes are, for example, processing financial accounts, managing human resources, or improving products quality. While social context consists of the beliefs and values about what are allowed or achievable within the group of people around the system.

Before going further into details how important information systems are for business, it is necessary to understand the terms "information" and "system". Information is defined as the data which has been processed for any purpose, and information is vital for decision makers. While system can be defined as a collection of several parts that have some purpose, these parts are interrelated so that a change in a part might lead to changes in others. (Curtis, G. & Cobham, D., 2008)

It is clear that information systems are strategic assets to organizations because they provide organizations competitive advantages by managing, organizing and making information available to decision makers. IS can even be the main difference between a soaring organization and an unsuccessful one. Thus the most crucial skills of a BIT expert are getting the IS to do what he wants, understanding what the systems can do, how they do it and especially being able to applying different types of IS into business activities. To clarify how IS became the major facilitator of modern organizations, Turban, McLean and Wetherbe (2002) listed the following major capabilities of IS in the book IT for Management. (Table 2)

TABLE 2. Major capabilities of Information Systems

Major capabilities of Information systems
Perform high-speed, high-volume, numerical computations.
Provide fast, accurate, and inexpensive communication within and between organizations.
Store huge amounts of information in an easy-to-access, yet small space.

Allow quick and inexpensive access to vast amount of information, worldwide.
Increase the effectiveness and efficiency of people working in groups in one place or in several locations.
Vividly present information that challenges the human mind.
Automate both semiautomatic business processes and manually done tasks.
Speed typing and editing.
Can be wireless, thus supporting unique applications.
Accomplish all of the above much less expensively than when done manually.

Finally we can examine the following case as a great example of IS implementation to have a better understanding about the importance of IS in practice. The case is about the health care system in Marysville, Kansas, a town of 12000 residents. All the hospitals, insurance companies, clinics, schools, ambulances, police and county health department in the town are connected to an information system. Whenever an accident occurred in a local school, information about the patient such as injury details and medical history is reported to the doctor in the hospital. Then the doctor can provide appropriate instructions for the temporary treatment, the transportation, and the preparation at the hospital. (Turban, E., McLean, E. & Wetherbe, J., 2002)

3.2.3 Digital Technologies and Internet of Things

Besides, it is worth mentioning that the Digital Technologies (DT) and the Internet of Things (IoT) are developing rapidly and changing the way we work alongside with IT.

The Digital Technologies can be defined as

"Today's digital world is concerned with creating, sharing, and using information in digital form. Digital information is data

that are structured and manipulated, stored and networked, subsidized and sold." (Conway, 2014)

In 2013, Robert Thomas, Alex Kass and Ladan Davarzani emphasized the role of DT in business in their journal. They explained that the DT can enable the intelligent processes in order to create a cycle of improvement from continuous feedback. DT was also argued to change the way the businesses are run in the next 5 years. (Thomas, R., Kass, A. & Davarzani, L., 2013)

In January 2014, according to author Varjonen, S., Rauss. W who has been the director of Finland's national Internet of Things Consortium summarized the benefits of IoT in the IoT Magazine 2014.

"In such smart surroundings, everyday objects will be able to interact with their environment, recognize us as individuals, help us, guide us or independently communicate with other humans, machines or computers." (Varjonen, 2014)

The revolution of IoT is ongoing to create a modern world full of smart things assisting human beings in tracking and counting everything to greatly reduce waste, lost and cost. This revolution has included many governments and organizations around the world. (Varjonen, 2014)

In the latest years, Digital Technologies and IoT Technology are impacting the ways people live and work. DT and IoT skills have not been introduced in the BIT programme since the programme focuses on providing business and IT skills for BIT specialists. However, as the programme is developed every year, modern technologies along with their expertise are always analyzed and considered to be included in the studies. We can expect to have these new skills and knowledge in future BIT programs. (Head of the programme, 2014)

4 THE BIT PROGRAMME IN LAHTI UNIVERSITY OF APPLIED SCIENCES

The studies of the Degree Programme in Business Information Technology in Lahti University of Applied Sciences are divided into three main parts in this thesis: basic studies, professional studies and studies about research skills. We will discuss all these three parts in the following sections.

4.1 Basic studies

The basic studies provided by the programme consist of basic ICT courses and business courses. Most of these courses are introduced in the first year or earlier stage of the second year.

4.1.1 Content and objectives of basic ICT studies

In basic ICT courses, firstly, the students have chance to be familiar with the most common IT equipment, the computer. At this phase, the students get the skills for the basic software that will be used both in office work and future study. In more details, the most essential office software such as Ms Word, Ms Excel and Ms PowerPoint are introduced. While knowledge about the hardware and operating systems at a fundamental level is also provided to ensure that the students confidently understand computers and be able to use computers as a tool for both studying and working. As the objectives of the programme is to equip learners with both theoretical knowledge and practical working tasks, ICT projects are in place throughout the whole programme study. There are three levels of ICT projects. As a part of the basic ICT studies, the ICT project one offers students chances to apply their basic IT skills to solve simple business work. More importantly, students can learn the difference between working as individuals and working as a team. Also, all the stages of a basic project such as project initiation, planning, execution, performance and close are covered. (Project-Insight 2014)

Secondly, basic IT studies cover the elemental courses for Information Systems Development such as Introduction to Programming, WWW Technologies, and

ICT Mathematics. These courses introduce the basic use of IT in solving business problems. Introduction to Programming is a primary course which helps the students get to know what programs are and how they were composed. C# is taught as the first programming language for students, and Visual Studio is used as the programming platform. With real-life oriented problems and solutions in form of programmes, the course aims to provide students basic understanding of algorithms and principles of programming, as well as the ability to create simple programmes. In the other hand, WWW Technologies introduces the structure of web-documents, and the essential commands of (X)HTML markup language and CSS stylesheet language, so that the students can style (X)HTML documents by CSS or even create basic web pages (Sore, S. 2012). And ICT Mathematics aims to provide students with the mathematical and logical bases of computer and automatic computing by teaching a wide range of mathematical subjects such as number systems, sets and relations, complexity, cryptography. Besides, Green ICT Project 2 is in place to provide students an environment to practice what they study from other courses simultaneously. For example, the project require each group of students to implement a web application to calculate the building's energy consumption in kilowatt hours. The project outcomes include fully a working and tested web application, an instruction for installation and a user guide. To successfully execute this project, students must combine skills and knowledge from other courses such as HTML and CSS skills from WWW Technologies course, C# from Introduction to Programming course and XML instructed in this project itself.

Finally, basic ICT studies contain courses about Object-oriented Programming and Databases. Object-oriented Programming (OOP) offers students the ability to implement an application using object oriented approach. But why do students need to learn OOP? Because OOP is the most common orientation to write a program, it keeps large software projects manageable. According to Marjin Haverbeke (2007), most of the programmers are exploiting the effectiveness of OOP and enthusiastically apply it to every problem.

"...convincing themselves they had finally found the right way to write programs." (Haverbeke, 2007)

While Databases offers students the ability to determine business concepts and their relationships so that they can illustrate business problems by different types of diagrams and models. After the courses, the students can design databases which are suitable for various business needs. They can also create and use databases through the SQL language. (Paananen, H. 2014)

As always, there is an ICT project for students to practice their skills as a team. The aim of the Green ICT Project 3 is to provide students a practical environment to create solutions for business problems using what they learn from courses OOP and Databases. For better understanding, we will examine the specific project given to the students in 2014. Each group of students are required to both design and implement a system for creating university class time table. For this project, each group must deliver a project plan, various models and diagrams to describe the system, the application with a database, project report and user manual. The application is implemented by the students using the skills acquired from programming and databases courses. The group work is implemented dynamically and professionally under the supervising of the lecturers. (Paananen, H. & Salopuro, A. 2014)

4.1.2 Content and objectives of basic business studies

Basic business courses are introduced to give students big picture about the business environments and operations. The key point here is that these courses ensure students can observe business problems under the eyes of IT specialists. Elemental business knowledge from these courses helps students understand better the use of IT skills learned from IT courses, it also support higher professional courses in later studies. There are five courses in this group: Human Resources, Financial Management, Customer Relations and Marketing, Logistics and Information Systems in Business.

Human Resources aims to help students recognize different organizational structures and positions in an organization. Also students learn to work, analyze and assist in different human resources processes in an employment life cycle. Many organizational issues are discussed to provide a picture about real life

working in an organization. For example, the following issues are examined: strategic human resources planning, recruitment, selection, orientation, training and development, career planning, international issues in human resources management.

The Financial Management course discusses financial information and financial management as a crucial element of an organization's operations. This course covers all the subjects necessary for efficiently manage money in order to accomplish the organization's objectives. For example, the subjects are covered: cost concepts, cost-volume-profit analysis, marginal costing, financial ratios, pricing decisions, budgeting. (Kouhia, Leea. 2014)

Marketing process, the role of marketing and the value of customer oriented thinking in an organization are discussed in course Customer Relations and Marketing. After the course, students are equipped with knowledge of basic strategies, concepts and competitive tools of marketing. More importantly, students can apply an appropriate marketing strategy in each specific business context. (Viljanen, M. 2014)

In Logistic course, the role of logistics operations in an organization is clarified and Incoterms are introduced. The objectives of this course are ensuring that students understand the importance of logistics, students know the stages of the purchasing process and most importantly, they can use common tools to solve logistic planning and management problems such as forecasting, inventory turnover, ABC-analysis and optimizing the size of delivery. (Laisi, M. 2013)

Information Systems in Business is one of the most important course among the basic studies because this course clarifies the link between business and IT. This course explore general business contexts in which information systems can be implemented to support business. Different types of information systems together with different features are discussed to give students the big image how information systems are established in an organization. Besides, the challenges of IT are also argued. (Ulmala, M. 2014)

4.2 Professional studies

Professional studies focus mainly on information systems (IS) subjects. As mentioned in previous sections, the BIT programme in Lahti UAS aims to provide students enough knowledge and skills to become IS specialists. The programme provides professional courses from designing IS, to implementing IS as well as managing IS. Also professional studies ensure the students can recognize the vital bond between business and IT, and they can determine the possible IT solutions for each business problem.

Professional studies of the BIT programme can be divided into two categories, the first one is Business Processes and Information Systems Design, and the other one is Information Systems Development Process.

4.2.1 Business Processes and Information Systems Design

Business Processes and Information Systems Design contains 4 courses: Business Processes and IS, IS Analysis and Design, Project Management, and Professional Communication and ICT Documentation in English. After taking these courses, students are expected to be able to define many types of business processes of a company's business operation. They must also understand the importance of effective communication among people from different processes in an IS. Moreover, students are trained to fully understand the utilization of IS in different business contexts as well as be able to take part in IS development process with basic approaches. Besides, these courses also give students opportunities to practice executing projects, writing documents and communicating in professional style.

In the course Business Processes and Information Systems, students learn to determine the key processes in modern organizations that follow functional structure (section 3.1.2). After that they can illustrate processes on a process flow chart or a process map. At this stage, the students are expected to master the use of IS in business, to fully understand different types of information systems with their functions. In short, this course aims to provide students enough knowledge about IS to confidently work with IS and explain IS to other users, especially the

businessmen. In the future, students can become IS analysts or consultants who act as the link between businessmen and IT staff in an organization. (Ulmala, M. 2014)

Figure 11 is an example of process modeling skill introduced in this course.

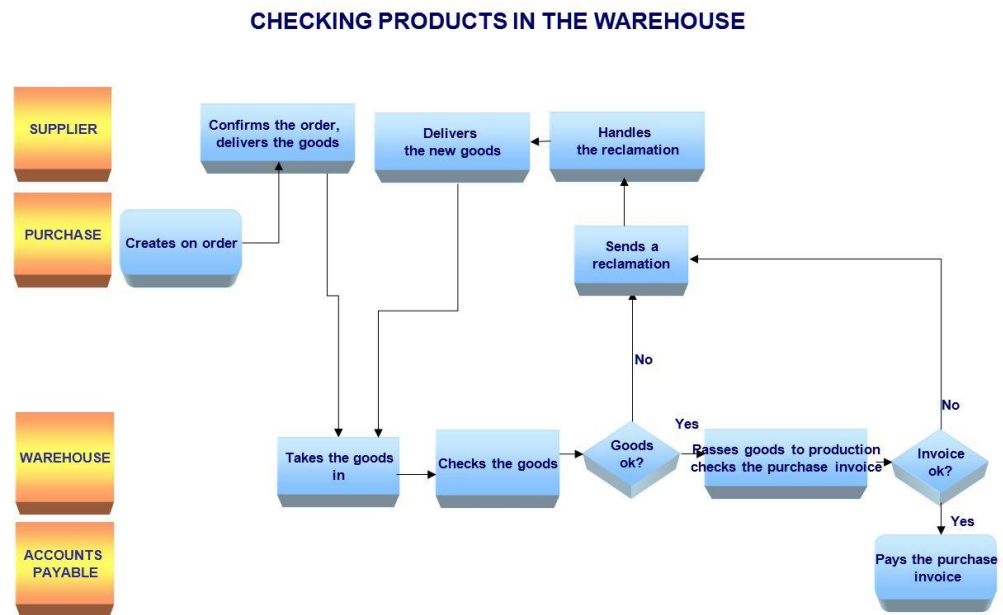


FIGURE 11. Checking products in the warehouse process

Information Systems Analysis and Design course offers knowledge of various concepts about IS such as the people problems between departments, the evolutionary development, the engineering and modeling theme, and the external development. For each concept, students must read the materials and write an essay to demonstrate their opinions about it. More importantly, this course provides students the practical skills to analyzing and redesigning the existing information systems. Students also learn to effectively collect requirements from future users and modeling them to design a new system. Microsoft tools such as MS Visio and MS Access are introduced to assist students with modeling the data. For example, first the students communicate with the customers to find out what data is used in the system and what kind of relations the data has. Then students work together to create an Entities Relationship (ER) diagram to check with the customers if they are on the right track or not. Second, the students turn the ER

diagram to the database specification and give it to the systems developers. In brief, students act as the bridge between system users and system developers. Figure 12 is an example of transforming an ER model to a database specification, the ER model was drawn by MS Vision and the database specification was created by MS Access. This example was given to the students as course material. (Paananen, H., Ulmala, M. & Guedra, H. 2014)

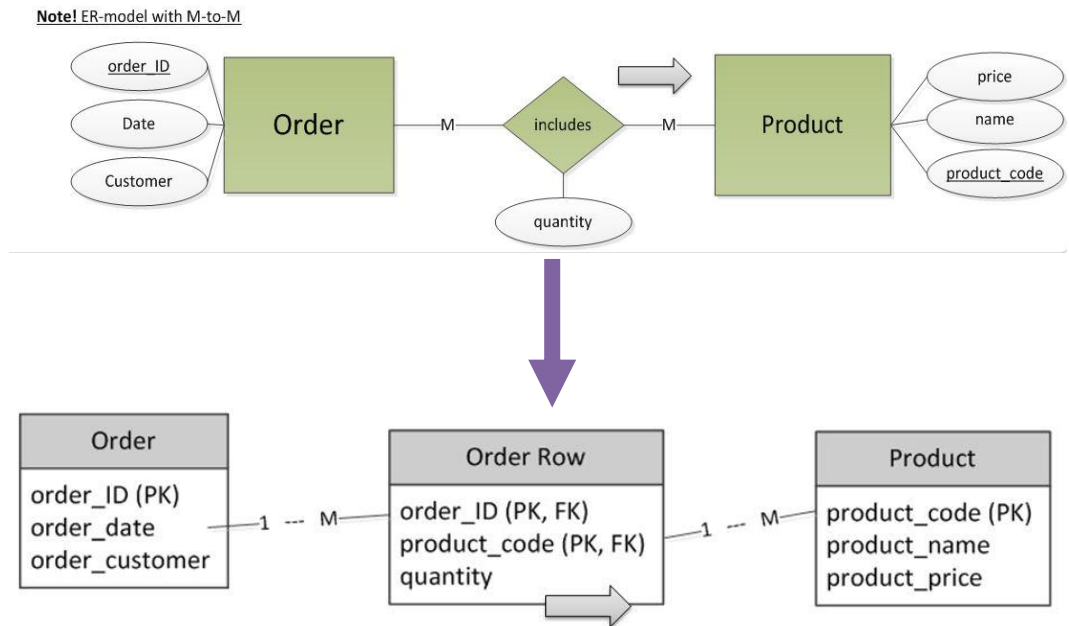


FIGURE 12. Example of transforming an ER model to a database specification

In order to train students to work together as a team to accomplish a project's objectives, the course Project Management is instructed. The theoretical part of this course covers a wide range of project management subjects, from project execution and control to project closeout, from role and duties of the project manager to the effective use of the project tools. While the practical part provides the students chances to create project plans to solve different business problems by using software Microsoft Project. (Ulmala, M. 2013)

Professional Communication and ICT Documentation in English focuses on developing professional working style for students. First of all, the students learn not to neglect the communication as bad communication or misunderstanding between project members usually lead to project failure. Their responsibilities are both communicating clearly in English and helping other project members to

understand each other. In addition, the students have chance to practice reading and composing professional documents about IS. (LAMK 2013)

4.2.2 Information Systems Development Process

The professional studies from this group aim to equip students with knowledge and skills to take part in the IS development process. The students can design new systems based on specific business needs or redesign legacy systems to keep them up to date. These studies also focus on ICT project skills, teamwork skills and professional English communication and documentation skills.

Practices in Information Systems Development introduces different types of IS development methods. The course introduces both traditional and agile development methods together with their ways of executing projects. Thus ICT project and teamwork skills are also practiced. Each group of three to four students was assigned a practical project of developing a system to help them be familiar with tasks and processes of the ICT project. (LAMK 2013)

ICT Project provides students with a practical working environment in which they can take several roles of a project such as project team member, secretary, project manager. As a student of this BIT programme, the author was a project team member of a 3-month-long project, which is mentioned here as an example. The main objective of this project was building part of a system which helps a housing company control the facilities booking. The team was given the opportunity to visit the client company, collect the requirements and opinions from the company's members and present the solution for them at the end of the project. The solution was created based on the company's main system, using MS Dynamics CRM. Every team member must conduct self-studies to familiarize himself with the software. Besides, the Project Management English course is integrated into the ICT Project to ensure the students can communicate, report and document professionally.

4.3 Research, development and innovation studies

This group of study provide students with principles, approaches and research methods of IS science. The courses introduced are Research Methods, Statistical Analysis, Inferential Statistics and SPSS, Academic Writing, Qualitative Research Methods and Design Science Methods for ICT Research. The students are expected to have professional reading and writing English skills, researching and reporting skills after taking these courses. (LAMK 2013)

4.4 Elective studies

Along with the mandatory courses mentioned above, students can choose to study other courses, based on their own preferences, as elective studies. According to the author's own observation, an elective course usually contains a trendy technology that would benefit the students for a certain career path. The variety of elective studies allow students to select and follow different career paths. For example, a student can choose to study more business courses or web related courses or programming courses. It is worth mentioning that by changing the courses available as elective courses every year, the programme is very adaptive to changes. Outdated technologies are replaced by modern technologies as the programme develops year by year.

4.5 Skills provided by the programme vs. skills needed by real BIT experts

With the findings after examining the studies provided by the BIT programme, it can be concluded that the programme equips students with both technical skills and general working skills. With these skills, a graduate can manage a wide range of tasks, from developing specific IT products to working with any information systems. At this point, the theoretical conclusion can be conducted, the skills introduced in the programme match with the skills needed to become a BIT expert.

5 INTERVIEWEES OVERVIEW

In this part, the background of each interviewee is reviewed. There are six interviewees in total and the names of the interviewees as well as their companies will not be mentioned. Instead, the interviewees will be referred by their title (Head of the Programme) or letter (interviewee A).

5.1 The head of the programme BIT, Lahti University of Applied Sciences

The current head of the programme BIT has been in this position for 4-5 years. She is responsible for both IT and BIT students in Lahti University of Applied Sciences. Her responsibilities include taking care of the students until they graduate and most importantly, developing the programme. Every year, the programme's structure remains the same but its content may be altered as the programme is always kept up to date.

In more details, technologies were examined to make decision on the programme development every year. Outdated technologies are taken away from the programme, and modern ones are added to introduce to students. Thus, the content of the courses may be changed or the whole course may even be replaced by a new course. For example, in 2009, Java language was used for teaching in the course Introduction to Programming as the first programming language introduced to students, while C Sharp was used in the same course in 2013.

The study guide must be planned and be ready before the students start the studies. While, the average study duration of a student in the BIT programme is four years. Which means at the latter half of the programme, every student is following a study guide which was created for them over three years ago. And in such a fast-paced world, a new technology can come out, become trendy then sink in just a few years. Therefore, the programme structure, which is represented by the study guide, must be constructed so that it is very adaptable to change.

"3-4 years is a pretty long period of time. You can see how fast the technical world is moving. Planning ahead which technologies to introduce in the programme is a very difficult task. All the teachers and students must be ready for changes all

the time to keep ourselves up to date."

(Head of the programme, 2014)

5.2 Graduates of the BIT programme, Lahti University of Applied Sciences

In this group, there are 4 interviewees who graduated from the BIT programme at Lahti UAS. All of them are working in IT-related field using several skills learned from the BIT programme. These interviews were conducted to collect information to figure out the relation between the skills these interviewees need for their work and the skills provided by the study programme. Besides, some opinions, experience and suggestions concerning the programme were also collected and analyzed.

5.2.1 Interviewee A

Interviewee A graduated from the BIT programme in 2014. A few month later, he started his first job which is also his current job. Interviewee A is working as an integration engineer for an American payment company, company A. Along with the skills learned from the programme, more specified skills were acquired by interviewee A to fulfill the requirements of the job.

When asked about the experience of the BIT programme, interviewee shared that the programming courses such as WWW Technology and Graphical Application Programming were the most useful courses. While the projects such as the three Green ICT Projects, the ICT Project and the practical training were mentioned as the most interesting ways to practice his skills. And finally, the most challenging problem that he faced was that there were not enough tutoring sessions to help him and other students to solve the programming tasks, which were always complicated.

5.2.2 Interviewee B

Interviewee B graduated from the BIT programme in 2014. At the moment, he is working as a web developer. Interview B is responsible for rebuilding the website for company B using Drupal. In order to fulfill the job requirements, interview B had to conduct self-study on the advanced skills from the internet. He also claimed that the team working skills and analytical skills helped him a lot with his job, while the coding skill helped him to learn the advanced skills.

According to interviewee B, the most interesting experience during the study programme was the practical training where he had a chance to learn in the real life working environments.

5.2.3 Interviewee C

Interviewee C is working as an export assistant for company C. The job requires both coding skill and designing user interface skill. While Interviewee C learned the coding skills from the programme, she had to learn about user interface design on her own and from her manager. Other skills such as modeling, analyzing, teamwork skills were mentioned as very helpful in assisting her daily tasks.

Even though the current work involve coding, interviewee C shared that coding was the problem she struggled with the most during the study programme.

Interviewee C did not prefer to work much with coding. She listed the following studies as most useful and suitable for her career aim: the course Information System Analysis and Design, the course Agile Methods, and the ICT Project.

5.2.4 Interviewee D

Interviewee D graduated from the programme in 2011. Since then he has taken more than one job. Interviewee D shared that in his first job after graduation, he struggled with many technical aspects such as revision control, continuous integration and deployment. He had to teach himself those skills to fulfill this job's requirement. Now interviewee D is the Chief Technology Officer of company D.

His responsibilities range from managing ICT projects, allocating tasks, managing IT products, supervising software's features.

When asked about the most challenging thing he had during the programme, interviewee D shared that he did not really have a big difficulty. However, he always worried that the programme could not offer him enough skills to find a job, so he tried to self-study a lot. And that was challenging. Also, Interviewee mentioned that his exchange programme study trip was very useful and memorable.

5.3 Business representative - Interviewee E

The purpose of this interview is to emphasize the impact of IT on business by examining the daily tasks of a businessman whose work is not related to IT. Interviewee E is working as a marketing and human resources assistant in company E which provides global internship solutions for students and companies.

Her daily tasks include marketing tasks and human resource tasks. Marketing tasks involve posting new vacancies on several European universities' websites and job websites. She also has to prepare handbooks of internship offers, look for new partners and make collaborations with them. For human resources managing tasks, interviewee E has to work with students every day. She has to check their profiles, answer their emails, the interview them, and assist the manager in arranging suitable internship positions for the students.

6 INTERVIEW ANALYSIS

6.1 The head of the programme BIT, Lahti University of Applied Sciences

There were three objectives in this interview. The first objective was to collect information about the development of the programme to clarify how the programme adapts to fast changing IT world. The second objective was to explain the aims of the programme, in more detailed, the skills and knowledge a graduate is expected to have after receiving basic, professional and other studies. Finally, this interview collected the head of the program's suggestions on some particular work that a graduate might have after graduation and later on.

6.1.1 The regular development of the BIT programme

Evidently, we are living in such a rapidly moving world, the demand of BIT experts is increasing and the skills demanded from BIT experts are always changing. Thus a programme that trains BIT experts must be developed regularly and constructed so that it can adapt to changes efficiently. In order to make decisions on the changes of the programme every year, the Head of the programme has to conduct studies from many sources. She needs to contact business clients to update what they expect from a BIT expert. On the other hand, students' feedback is also studied to explore what they expect to learn, as some students with their own future work plans know the best which technologies they need. In other words, the Head of the programme has to understand both the employers and the training employees to update the modern skills for the future work environments and determine the most suitable technologies to be introduced to students. Moreover, opinions from other lecturers are also considered so that a lecturer may change the specified technology or teaching method of a course but still keep the overall objectives of the course. Besides, the Head of the programme and also other lecturers of the programme have to take professional studies every year to keep updating their knowledge.

"Because it takes about 4 years for a student to complete his studies. We need to plan ahead the next 4-5 years when introducing a study guide. We need to update the modern skills

for the future." (Head of the programme, 2014)

The Head of the programme provided an example of the programme development as follows. The Second Life, an online virtual world for people to socialize, was introduced in the BIT programme in 2010. At that time the technology was relatively new, trendy and promising. A guest lecturer who was an expert of Second Life was invited to guide the students and assist the lecturers. But then the technology lost its popularity, thus it was removed from the programme content.

6.1.2 The objectives of each group of studies in the BIT programme

In this thesis, the studies of the BIT programme are divided into three main group of studies, the basic studies, the professional studies and the studies that contain project and teamwork skills. The Head of the programme clarified the objectives of each group as follows.

First, the basic courses help students know common business concepts, be familiar with basic IT languages, be able to use basic software to utilize IT and get the overall picture of business IT. In brief, students are expected to have enough elemental knowledge and skills from basic courses so that they are able to study advanced skills on their own. Students should also be able to figure out which career paths are suitable for them after taking the basic courses.

For example, in first year, students are introduced with WWW Technologies in class. Then in second year, third year or even when they have graduated, they should figure out which web technologies are trendy and suitable for their own career plan. After that, students should study these technologies on their own to become a web developer if the technologies are not available in the study programme.

Second, the Head of the programme emphasized the importance of IS in business and explained the professional studies which mainly focus on IS skills. The role of information systems are to ensure confident flows of information among the business sections. In other words, establishing good IS is one of the key success

factors of modern businesses. The programme offers a wide range of IS skills, which can be divided into 6 categories. These categories are Business Management, Technical Management, Design, Development, Service & Operation, and Support. For each category, examples were given about what types of work a student might have after graduating from the programme or later in the future when he has earned certain experience. We will review the examples of each category in next section (6.1.3). For now, we examine a typical scenario drawn for a graduate who has acquired the professional skills provided by the programme.

When a graduate comes to work in a company with a certain business, he has opportunities to study deep in detail about that specific business context. At this point, the business courses help him to understand the company's business problems easier and faster. On the other hand, the IS skills helps him with the technical problems, and let him be able to take part in any company's work related to IS phases such as designing, implementing, developing and maintaining IS. Besides, the student can also combine his business knowledge learned from the company with his IT skills learned from the programme and from his own study to develop a software or a website for his company.

Finally, the importance of teamwork and project skills were also stressed. Nowadays, the projects are done in agile ways which require so much communication and mutual understanding between team members. During the whole study programme, a student is given many opportunities to work in different projects and to work with different team members. Through these projects' experiences, he can figure out his own strengths and weaknesses. Practical experiences help him understand that good teamwork can maximize strengths in each team member and in projects, the sum is greater than the parts.

6.1.3 Suggestions and expectations from the Head of the programme

"Nobody comes in as a manager." (Head of the programme 2014)

The Head of the programme suggested that a graduate might start his first job as a developer or assistant then after years of experience, he should be able to find a job with more advanced skills. Besides, the following career paths were mentioned as examples for students to target.

In the field of Business Management, a student can work as a Business Information Manager (BIM) whose main mission is ensuring the relevance between IS and company's business. A BIM proposes changes or anticipates changes to both IS and company's business.

In the field of Technical Management, ICT Project Manager is highly recommended. An ICT Project Manager is a project manager of ICT projects, thus he has duties as a project manager such as assigning tasks to project members, developing time milestones, managing the resources and budgets.

In Design field, Systems Analyst is a suitable job for a BIT expert. In fact, the BIT programme provides a lot of skills and knowledge for a student to be able to work as a Systems Analyst. These skills include analyzing the requirements from systems' users, and proposing resolutions and improvements for the systems.

In Development field, Developer is a very suitable career aim for any student in the BIT programme. A Developer is usually good at coding to take part in building or coding ICT solutions such as websites, software or parts of an IS.

There are many suitable jobs for students in the field of Service and Operation. For example, a Database Administrator is responsible for maintaining the database to support IS that meet company's business need. Another job in this area is Technical Specialist, who has to maintain and repair the hardware and software components of the company.

A student can also become an ICT Consultant if he wants to follow the Support area. An ICT Consultant must understand the company's business activities and know how to apply suitable IT solutions on the company's business. Also, he should be to communicate efficiently with both businessmen and IT specialists.

While the programme is constructed to equip students with the essential skills of BIT experts, students are also expected to study on their own a lot.

As mentioned in a previous section, the programme needs to be developed regularly to keep the technologies introduced to students up to date. But that alone is not enough to ensure that students possess the most suitable technologies for them. Students should be able to figure out which skills they want to have from practical projects and keep themselves up to date with the newest technologies, "the future studies", according to the Head of the programme.

ICT Project provides a good example of acquiring "the future studies". While doing a real life oriented project, a student earns practical experience for himself. In addition, he has chance to know the opinions of other project members. All of these might lead to a result that the student figures out new skills that will become popular in near future. Then he should find ways to study those skills on his own and he can also propose those skills while giving feedbacks about the programme.

6.2 Graduates of the BIT programme, Lahti University of Applied Sciences

The answers from four interviewees were analyzed to find the relations between the skills offered by the BIT programme and the skills applied by the graduates. The first thing to notice when analyzing the answers is that all four of the graduates are working in different types of job, thus, applying different skills equipped by the study programme. We will examine the details of each interviewee's jobs and skills required for their jobs.

Interviewee A is working as a developer, his job involves mainly coding and software developing skills. In more details, the daily tasks of interviewee A include developing modules, widgets and custom features for company A's integrated software. Interviewee A also assists customers when they have technical questions. To fulfill these tasks, interviewee A shared that he applied many skills learned from the BIT programme.

*"I use a lot the programming and technical skills equipped from projects and practical training. Teamwork and communication skills are also helpful, and self- studying ability, too."
(Interviewee A 2014)*

Interviewee A continued to explain that with his self-studying ability, he could learn other programming languages that his manager demanded. Moreover, with the information systems related skills learned from the study programme, he could quickly get on with the company's internal systems. With these systems, interviewee A can contact and support customers online, check and approve the integration of company's products, and communicate with other employees in other countries.

In contrast to interviewee A, interviewee B's work concerns more about user interface and design, not just coding. As a web developer, interviewee B had to teach himself PHP and JavaScript skills which were only introduced at basic level by the study programme. While teamwork and analyzing skills are mentioned as very useful for his job.

"I apply some basic skills in coding and such, but I had to self-study advanced skills from the company and from the Internet. Teamwork skill and analytical skill were also very useful and

applicable."

The system interviewee B is working with is the online system which contains the basic structure of company B's website, a database and a server. Interviewee B shared that it was very difficult at the beginning as he lacked of knowledge and practical experience to deal with the work. But as time went on, he learned the necessary skills, everything was easier.

As an export assistant, interviewee C's job includes both coding and user interface designing skills. Her tasks include promoting products, creating ideas, receiving requirements from customers then analyzing them to build models. For these tasks, several skills learned from the study programme were applied, such as, coding, modeling, analyzing, project planning and managing, and agile development method.

The systems and software that interviewee C is working with are Freedcamp, MS Outlook, and Yammer. When asked about how she got on with these systems at the beginning, interviewee C answered that she needed a lot of help from her manager and friends, also she explored the systems a lot on herself.

"I did not know where to start and there were more than I thing I had to learn. My manager and my friends helped me a lot. Well, I also explore those systems myself." (Interviewee C 2014)

Three years after graduating from the BIT programme, interviewee D is now a Chief Technology Officer of a software providing company. He is responsible for many processes such as technical recruitment, work-value estimation, technical outsourcing, software quality assurance, and product features supervising. When asked about which skills learned from the study programme he can apply to his job, interviewee D mentioned programming, database, testing, SWOT analyzing, analytical thinking, multicultural and interpersonal skills. Also the SCRUM development method practiced in the BIT programme helps him a lot with his work.

Interestingly, interviewee D mentioned that one of the system company D is using and selling was built by Interviewee D. This system allows and encourages all employees of a company to share their interesting professional content

conveniently, thus, increases the communication within the company. Apparently, Interviewee D is also responsible for providing training session to end users of this system. It did come as a surprise when the interviewee D mentioned that he had to self-study a lot.

"I studied a lot from Google, Wikipedia, Stackoverflow and Github." (Interviewee D 2014)

When looking at the answers from the graduates, the answer which was given by all of them is that they had to self-study a lot to fulfill the demands of their jobs. Many skills provided by the BIT programme are applied into their jobs or help them to learn new skills more effectively. Also, when they come to work in a certain company, new skills and knowledge appear, they always have to study new things and work at the same time. It can be concluded that the BIT programme at Lahti UAS provides enough skills for the graduates to work in IT field while they must also study on their own the skills specified for each job.

Besides, the interviewees also shared their thoughts about what would help them better in their careers if they were included in the programme. Interviewee A, who is a software developer, suggested the programme to have more advanced programming courses and more tutoring sessions to assist students with programming tasks. While interviewee B suggests that the programme should provide more advanced skills in different IT aspects so that it is easier for students to customize their career paths. As opposed to interviewee A, interviewee C recommended *"anything else than coding"*, such as more courses about designing, analyzing or managing IT for businesses. Lastly, with his own working experience, interviewee D proposed very concrete IT subjects such as revision control, continuous integration, deployment and quality assurance.

6.3 Business representative

In order to understand how IT is utilized in the interviewee's work, let us examine the main business process that she is involved. The name of this process is making collaborations with companies who are looking for interns. The process includes this following phases: posting new vacancies on websites, connecting with job websites and universities to reach new students, receiving applications from students, checking students' profiles, arranging online interviews, searching for a suitable job for a student from the company's database, sending the job offer to the student, sending the student's profile to the company offering the job, and finally updating the student's information in the database.

All of the above activities are done online. That means Information Technologies are adapted throughout the whole process or even the whole business of company E. More specifically, Roundcube Webmail, Google Document, Biton systems are utilized by interviewee E to fulfill her tasks. In addition, there are several technical difficulties that interviewee E has to face with regarding the mentioned systems. For example, with Google Document, once a piece of information is unintentional deleted by a co-worker, it is very difficult to retrieve the information back, or when a new student's profile is added to the Biton system, there is not any notification to interviewee E, thus she has to recheck the database regularly.

Interviewee E learned to use all the software and systems from her manager and from her own study. Also, she shared that it took her time to be familiar with all the software, and she did not encounter any big problem with those so far. However she knows that with major technical problems, she can ask for help from the IT supporter.

Besides, when asked about the tasks that are not done by computer, interviewee E mentioned a situation in which she works with a white board instead of a computer. A big white board is used by a group of employees to highlight the vacancies that need to be taken urgently. Every time interviewee E interviews a student and offers him or her a job, she has to check the vacancies list on the white board first. This way, her work can be done more easily and more conveniently.

In conclusion, even though interviewee E does not work in an IT field, her job requires IT to be done and to be done effectively. The case of interviewee E and company E is just an example to confirm the truth, mentioned in the theoretical part (section 3), that in the modern business environments there is not a company that can operate competitively without the application of IT.

7 CONCLUSIONS

7.1 Summary

This thesis aims to clarify whether the graduates from the BIT programme at Lahti UAS have the skills to work as BIT experts in modern business environments. The author himself is a student of the study programme, thus, he had opportunities to directly participate in and observe the programme's studies. Accordingly, the introduction provides the thesis's background, the research objectives and the thesis structure. In the Research Approach section, the research question is stated, the reasons for choosing qualitative research method and deductive approach are argued, and a research framework is provided. The main study is divided into the theoretical framework written in section 3 and 4, and the empirical findings in section 5 and 6.

The theoretical study of this thesis includes 2 different parts. In the first part, this thesis presents the overall picture of modern business environments from the IT point of view in order to emphasize the need for BIT experts in such a competitive working environments. After that, the skills required for BIT experts are presented by analyzing how IT is utilized to support business processes. In the second part, this thesis examines the specific skills provided by the BIT programme at Lahti UAS and compares them with the real life skills found in the first part to draw a theoretical conclusion.

The empirical findings provide practical evidences to the theoretical study by analyzing the answers from three groups of interviewees. The first group includes the Head of the programme BIT who provides information about the development and the objectives of the BIT programme, while the second group consists of four programme graduates who are working in the IT field. The relation between the skills offered by the BIT programme and the skills applied by the graduates is analyzed. The last group includes a business representative who does not work in the IT field but still needs a lot of support from IT to fulfill her job. The application of IT in her work is examined to emphasize the vital role of IT in business.

7.2 Answering the Research Question

To answer the research question,

Do the students graduated from the BIT programme at Lahti UAS possess the professional knowledge and skills to work as BIT experts in modern business environments?

this thesis applies the findings from both theoretical and empirical parts. The research question can be answered and a final conclusion can be made. The students graduated from the BIT programme at Lahti UAS have enough knowledge and skills to work as BIT experts in modern business environments. And in order to work effectively, the students must conduct a lot of self-study before and after graduation, and when they start to work in a company with its unique demands.

7.3 Limitation

The main limitation of this thesis is that for empirical findings, only four graduates were examined. Thus, the findings might contain fewer issues than if they were conducted on all the graduates. Also, this thesis only includes one businessperson who cannot represent all the businessmen in the world. However, the conclusion that IT has a big impact on business is similar to other studies.

PUBLISHED REFERENCES

Babbie, E. 2010. *The practice of Social Research*. Thirteen edition. Cengage Learning.

Curtis, G. & Cobham, D. 2008. *Business Information Systems*. Sixth edition. Pearson Education Limited.

Goddard, W. & Melville, S. 2004. *Research Methodology: An Introduction*. Second edition. Juta Academic.

Hammer, M. & Champy, J. 2006. *Reengineering the Corporation: A Manifesto for Business Revolution*. Rev Upd edition. HarperBusiness.

Hennink, M., Hutter, I. & Bailey, A. 2011. *Qualitative Research Method*. SAGE Publications Ltd.

Haverbeke, M. 2007. *Eloquent JavaScript - A modern introduction to programming*. First edition. No Starch Press.

Magal, S. & Word, J. 2012. *Integrated business processes with ERP systems*. First edition. WILEY.

Myers, D. 2009. *Qualitative research in Business & Management*. First edition. SAGE Publications Ltd.

Sward, D. 2006. *Measuring the Business Value of Information Technology*. Richard Bowles

Turban, E., McLean, E. & Wetherbe, J. 2002. *Information technology for management*. Second edition. WILEY.

ELECTRONIC REFERENCES

Borgatti, S. 1999. *Elements of Research*. [referenced 5.September 2014].

Available at <http://www.analytictech.com/mb313/elements.htm>

Bragg, S. 2013. *Accounting Tools*. [referenced 20.September 2014]. Available at

<http://www.accountingtools.com/functional-org-structure>

Burney, A. 2008. *Inductive & Deductive research approach*. [referenced

20.September 2014]. Available at

<http://www.drburney.net/INDUCTIVE%20&%20DEDUCTIVE%20RESEARCH%20APPROACH%2006032008.pdf>

Chegg Inc. 2014. *Definition of Manufacturing Process*. [referenced 20.September

2014]. Available at [http://www.chegg.com/homework-](http://www.chegg.com/homework-help/definitions/manufacturing-processes-5)

[help/definitions/manufacturing-processes-5](http://www.chegg.com/homework-help/definitions/manufacturing-processes-5)

Conway, P. 2014. *Digital Technology Made Simpler*. [referenced 20.September

2014]. Available at [https://www.nedcc.org/free-resources/preservation-leaflets/6.-](https://www.nedcc.org/free-resources/preservation-leaflets/6.-reformatting/6.3-digital-technology-made-simpler)

[reformatting/6.3-digital-technology-made-simpler](https://www.nedcc.org/free-resources/preservation-leaflets/6.-reformatting/6.3-digital-technology-made-simpler)

Kouhia, L. 2012. *Financial Management Course Content*. [referenced 29.October

2014]. Available at <http://reppu.lamk.fi/course/view.php?id=7202>

Laisi, M. 2013. *Logistics Course Objectives*. [referenced 20.September 2014].

Available at <http://reppu.lamk.fi/course/view.php?id=9468>

LAMK. 2013. *BIT 2013-2014 Study Guide*. [referenced 1.September 2014].

Available at <http://www.lamk.fi/koulutus/opinto-opas/Documents/ops1314-lt-business-information-technology.pdf>

Lunt, B. & Ekstrom, J. 2008. *Information Technology 2008*. [referenced

20.September 2014]. Available at

<http://www.acm.org/education/curricula/IT2008%20Curriculum.pdf>

McFarlan, F. 1984. *Information Technology Changes the Way You Compete*.

1984. [referenced 5.September 2014]. Available at

<http://hbr.org/1984/05/information-technology-changes-the-way-you-compete/ar/1>

Paananen, H. 2014. *Databases Course Description*. [referenced 25.October 2014]. Available at <http://reppu.lamk.fi/course/view.php?id=9936>

Paananen, H. & Salopuro, A. 2014. *Green ICT Project 3 Task Description*. [referenced 20.September 2014]. Available at <http://reppu.lamk.fi/mod/page/view.php?id=576031>

Paananen, H., Ulmala, M. & Guedra, H. 2014. *IS Analysis and Design Course Syllabus*. [referenced 20.October 2014]. Available at <http://reppu.lamk.fi/mod/page/view.php?id=572197>

Project-Insight. 2014. *5 Basic Phases of Project Management*. [referenced 20.September 2014]. Available at <http://www.projectinsight.net/project-management-basics/basic-project-management-phases>

Rouse, M. 2005. *What is business process*. [referenced 20.September 2014]. Available at <http://searchcio.techtarget.com/definition/business-process>

Rowlands, H. 2005. *Grounded in Practice: Using interpretive research to build theory*. [referenced 20.September 2014]. Available at www.ejbrm.com/issue/download.html?idArticle=152

Sore, S. 2012. *WWW Technologies Course Syllabus*. [referenced 20.September 2014]. Available at <http://reppu.lamk.fi/mod/page/view.php?id=347250>

Still, J. 2001. *What is IT? What are IT skills?*. [referenced 20.September 2014]. Available at http://www.jsmusic.org.uk/it_skills/what_are_it_skills.html

Taylor-Powell, E. & Renner, M. 2003. *Analyzing qualitative data*. [referenced 20.September 2014]. Available at <http://learningstore.uwex.edu/assets/pdfs/g3658-12.pdf>

Thomas, R., Kass, A. & Davarzani, L. 2013. *How digital technologies are changing the way we work*. [referenced 20.September 2014]. Available at

<http://www.accenture.com/us-en/outlook/Pages/outlook-journal-2013-how-digital-technologies-are-changing-the-way-we-work.aspx>

Ulmala, M. 2013. *Project Management Course Syllabus*. [referenced 20.September 2014]. Available at <http://reppu.lamk.fi/mod/page/view.php?id=478920>

Ulmala, M. 2014. *Information Systems in Business Course Syllabus*. [referenced 20.September 2014]. Available at <http://reppu.lamk.fi/mod/page/view.php?id=523298>

Ulmala, M. 2014. *Business Processes and Information Systems Course Syllabus*. [referenced 20.September 2014]. Available at <http://reppu.lamk.fi/mod/page/view.php?id=566953>

Varjonen, S. 2014. *Internet of Things*. [referenced 20.September 2014]. Available at www.internetofthings.fi/file.../get/IoT%20Magazine%202014.pdf?

Viljanen, M. 2014. *Customer Relations and Marketing Course Syllabus*. [referenced 20.September 2014]. Available at <http://reppu.lamk.fi/mod/page/view.php?id=543368>

Zwass, V. 2014. *Information systems*. [referenced 20.September 2014]. Available at <http://global.britannica.com/EBchecked/topic/287895/information-system>

ORAL REFERENCES

Head of the programme BIT. 2014. Head of the programme BIT. Lahti University of Applied Sciences. Interview 17 October 2014.

Interviewee A. 2014. Software developer. Company A. Interview 21 October 2014.

Interviewee B. 2014. Web developer. Company B. Interview 22 October 2014.

Interviewee C. 2014. Chief technology officer. Company C. Interview 24 October 2014.

Interviewee D. 2014. Export assistant. Company D. Interview 24 October 2014.

Interviewee E. 2014. Marketing and HRM assistant. Company E. Interview 20 October 2014.

APPENDICES

APPENDIX 1

Head of the programme interview questions:

Could you tell me about your background as the head programme of BIT?

Who are involved to develop the programme content every year?

What are the objectives of the basic studies?

As business studies are only introduced at basic level, how much the students should learn and understand the business so that they can work as a BIT expert?

As the professional studies focus on IT, especially information systems, could you specify the work families that the students can take part in?

How do you expect the students to start with their first jobs after graduation?

How much do you expect them to study the skills that are not introduced in the programme so that they can work more effectively in the future?

Could you suggest a few jobs that the students can work after graduation?

APPENDIX 2

Graduates of BIT programme interview questions:

What was the most interesting course, project or experience that you got while taking part in the BIT programme provided by Lahti UAS?

What was the most challenging thing you faced during the study in BIT programme?

What problems and limitations did you have with your first job?

Could you describe your current job? What are your daily tasks?

Which business processes are you involved in?

Do you work with any information systems? Could you describe the information systems?

How did you get used to the systems? (By user guide book, IT supports or self-exploring)

What kinds of difficulties did you face when starting to use the systems? Where did you get help when you have a problem?

Do you apply knowledge and skills learned from the programme to your current work? What kinds of knowledge and skills are they?

How about the project tools, development methods and teamwork skills that you learned from the programme? Do you find them useful for your job?

How did you learn the skills and knowledge which were not introduced in the BIT programme to do your job?

What subjects do you think would help you to do your job better if they were introduced in the programme study?

APPENDIX 3

Business representative interview questions:

Could you introduce your company's business?

Could you describe your current job? What are your daily tasks?

Does your work involve computers and information systems?

Which business processes do you take part in? Do they utilize the use of any information systems?

How did you get used to the computer and the systems?

What kind of difficulties you have faced while using the systems?

What do you do when you encounter a technical problem?

Do you find it easy to communicate with the IT supports?

What kind of tasks do you do without a computer?