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4. course 1. group day student

Ajiniyaz Kurbanaev

Student ID No.191AIC028

Student’s signature\_\_\_\_\_\_\_\_\_\_\_

Akhliddin Isomiddinov

Student ID No.191AIC011

Student’s signature\_\_\_\_\_\_\_\_\_\_\_

Bakhtikushod Ergashaliev

Student ID No.191AIC009

Student’s signature\_\_\_\_\_\_\_\_\_\_\_

Scientific advisor: Agnese Batenko.

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# INTRODUCTION

Firstly, the role of Information communication technology (ICT) in our life. ICT permeates all aspects of life, allowing people to communicate with people, gain access to information, and learn in faster and better ways.

Information and communication technology (ICT) is critical to the success of every organization. It promotes employee communication, automates numerous corporate activities, and increases project transparency. This will improve client and staff happiness, raise profitability, and allow you to develop.

The appeal is not difficult to comprehend. Mobile users have fast access to email, electronic fax (eFax), social networking, chat, and instant messaging facilities in addition to audio and video conversations. A broad and increasing ecosystem of mobile applications and web resources underpins all of this. For organizations in the market for Information and Communication Technology solutions, developments in cloud infrastructure now present a rich vein of choices that include Software as a Service applications, data management tools, and various emerging technologies. Information and Communication Technology is creating a new breed of “industrial wearables.” Tools and equipment such as smart glasses and biometric sensors that can link individual workers with remote databases or industrial resources, and robotic exoskeletons that can multiply the strength of the wearer.

For schools and colleges, Data and Communication Innovation gives understudies with locks in, intuitively, and self-paced strategies of learning which increment their freedom and inclusion within the learning handle, whereas moreover expanding their levels of computerized advancement and computer education. ICT-powered learning ventures empower instructors and educates to contribute their claim input whereas ceaselessly analyzing and checking the advance of their understudies.

**The object** Project implementation process. **While, for the subject** Information technologies in project implementation process. **The aim is** Analyze the usage of information technologies in project management in order to develop recommendations for improvement of project implementation process

Tasks:

1. To study theoretical aspects of Information technologies in project management.
2. To compare the positive and negative sites of Information technologies in project management
3. To study the impact of Informational communication technology in the society.
4. To analyze the role of Information technologies in global market.

**Limitation** Period of used data and statistics is (2011 - 2022) years. The research covers information technologies of EU and Sweden particularly.

**Research period**: February 2022 – May 2022.

**Research sources:** information was founded by using resources like websites, books, research works, magazines. Below in 3 chapters of the research will be shown all descriptions about ICT, Analyses of usage information technologies in project management, the impact of ICT in the society, actual problems with information technologies.

# Theoretical aspects of information technology in project management

1.1 Definition and history of information technology

Firstly, Information and Communication Technology (ICT) is a blanket term encompassing all the technologies and services involved in computing, [data management](https://itchronicles.com/technology/environmental-management-systems-changing-the-way-data-is-managed/), telecommunications provision, and the internet. Information technology (IT) is building communications networks for a company, safeguarding data and information, creating and administering databases, helping employees troubleshoot problems with their computers or mobile devices, or doing a range of other work to ensure the efficiency and security of business information systems. Comparison between IT and ICT is that the IT is providing to employees solve the problems with work or saving database and others and ICT is help to people communicate in a distance share a information between people. (IT, n.d.)

Here is a ICT definitions which all of them help to communicate and find informations:

* Android - is a Linux-based operating system designed primarily for touchscreen mobile devices such as smartphones and tablet computers.
* APP - is an abbreviation for application, usually refers to a software for a specific device or purpose.
* Application - a computer software designed to help you perform a specific task.
* Browser - a software program which provides access to web pages pages, e.g., Internet Explorer, Mozilla Firefox, etc. (university W. , n.d.)

The first mechanical computer device was conceptualized and invented by English mechanical engineer and polymath Charles Babbage in the early 19th century. Called the ‘Difference Engine,’ it was originally created to aid in navigational calculations. Often referred to as the ‘Father of the Computer’, Babbage came up with the more general ‘Analytical Engine’ in 1833 which could be used in fields other than navigation. Funding constraints meant that Babbage died without seeing his machine completed, however his son Henry completed a much simpler version of the machine in 1888, which was successfully demonstrated to the public in 1906. (IT, n.d.)

Early computers were not developed until the mid-1900s, when a more compact analogue electromechanical computer, that used trigonometry, was installed on a submarine to solve a problem with firing torpedoes at moving targets. The Z2, the first electromechanical digital computer, invented by Engineer Konrad Zuse in 1939, used electric switches to drive, and relays to perform calculations. Devices like the Z2 had very low operating speeds and were eventually succeeded by faster all electric machines, such as the first fully automatic 1941 Z3, also created by Zuse. (IT, n.d.)

Colossus, a set of computers created between 1943 – 1945, are widely recognized as the world’s first programmable electronic digital computers. Popularized by its use during World War II Colossus were used in intercepting and deciphering encrypted German communications from the Enigma machine. English computer scientist, mathematician, and theoretical biologist Alan Turing conceptualized modern computers in his 1936 seminal paper ‘On Computable Numbers’, whereby programmable instructions are stored in the memory of a machine. (IT, n.d.)

Another early programmable computer was the Manchester Mark 1 developed by the Victoria University of Manchester. Frederic C. Williams, Tom Kilburn, and Geoff Tootill began working on the machine in August of 1948, but the first operational version of the computer was not available for use until 1949. The Manchester Mark 1 caused controversy when British media outlets referred to it as an electronic brain, which provoked a long-running debate with the department of Neurosurgery at Manchester University. They asked whether an electronic computer could ever be truly creative. (IT, n.d.)

The first computer used in processing commercial business applications was developed by the Lyons Tea Corporation to increase business output in 1951 – Leo I.

A brief timeline of some other important events is listed below:

* 1835 – Morse Code invented by Samuel Morse
* 1838 – Electric Telegraph invented by Charles Wheatstone and Samuel Morse
* 1843 – Typewriter invented by Charles Thurber (IT, n.d.)

In a present-day setting, the term of ‘IT’ is commonly utilized to depict computers and systems inside a trade environment. It alludes to their applications in: creating, controlling, putting away, recapturing, transmitting, taking care of, trading, examining and securing all information or data in an electronic organize. IT is additionally utilized as an umbrella term to cover: tv, media transmission gear, computer program, e-commerce and the internet. (IT, n.d.)

Theoretical aspects and practical aspects of data processing systems (DPS) development are described. The main attention is paid to distributed DPS design and development. The main goal of the course is to strengthen competence in the field of application of DPT based on the set of mathematical models. To formalize application domain, to form and analyze user information requirements. To advance skills in the development of DPS demonstrators based on mathematical models and in the application of special case tools for mathematical models processing. (university R. t.)

To conclude, comparison between IT and ICT definition of this theories and historical parts of information technology in project management. First mechanical computers, programable computers, electromechanically digital computers and about people who develop and invented. And this tools, applications and tools helps people to simplify the life.

1.2 Assessment of project management and its implementation

Project management is the application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters. Project management has final deliverables that are constrained to a finite timescale and budget. (www.apm.org.uk, n.d.)

Today, project managers may be more likely to be building a photo app than calculating ballistics. However, that may just be a testament to the ubiquitous usefulness of the techniques developed by past managers.

The project management lifecycle is a step-by-step structure of best practices for guiding a project from conception to completion. It gives project managers a method for planning, executing, and completing projects. The project management lifecycle consists of four steps: initiating, planning, executing, and closing. (Coursera, 2022)

Initiating: In the initiation phase, you’ll define the project. You'll figure out the project's objectives, scope, and resources, as well as the team's duties. Communicating with stakeholders to ensure that they are aware of the project's goals and objectives, determining the project's scope, setting SMART objectives (specific, measurable, achievable, relevant, and time-bound) ,defining resources such as money and deadlines, confirming the size of the team and the jobs that are necessary (Coursera, 2022)

Planning: In the planning phase, team should create a plan to step by step achieve them.

Steps: Deciding on milestones that lead up to goal completion, developing a schedule for tasks and milestones, including time estimates and potential time buffers, establishing change processes, determining how and how often to communicate with team members and stakeholders. (Coursera, 2022)

Close projects: In this phase, team will show finished product activities and done work.

Steps: Conducting retrospectives and take notes of changes you can implement in the future, communicating to stakeholders of the end of the project and providing an impact report, communicating with the new owners of a project, creating a project closeout report, celebrating the end of the project and your successes (Coursera, 2022)

To conclude, in this chapter highlighted team work, skills management, Implementation plan to achieve the goal. Project management life cycle definition and step by step activities.

1.3 Description of the role of technologies in project management

The project management method has been used by task management teams to plan and execute large-scale projects for decades. Despite the fact that the legacy strategy has evolved through time, the introduction of current physical technology and cloud-based software solutions is fast altering the game. Today, technological advancements have been instrumental in providing the right project management tools that can help your projects succeed. Previous generations of project managers and teams could only fantasize about these valuable tools and wish they had been available at the time. These project management tools have simplified project tasks. They have also improved the performance of the members and created a better overall collaboration experience. (Jacob, 2021)

Tools like A Gantt chart, Logic Network, PERT chart, Product Breakdown Structure and Work Breakdown Structure are standard tools used in project planning.tools are used for external and internal communication. **These tools include mail, email, telephones, cell phones, smartphones, computers, video and web conferencing tools, social networking, as well as online collaboration and productivity platforms.  We begin with some basic communication tools and then discuss computers.** (www.scu.edu, n.d.)

**Mail: Even with all the modern methods of communication, regular postal mail is still a powerful tool for a business. It adds a personal touch and is often used for delivering secure documents and contracts and for delivering purchased items to customers.** (www.scu.edu, n.d.)

**Telephones: The cornerstone of your business communication, both external and internal, may be your telephone. There are many types of telephones, and only you can decide which type is right for you. Even the standard telephone (landline) that is installed in your office has many options.** (www.scu.edu, n.d.)

Nowadays technologies play a crucial role in our life. Most project managers say that communication is the key to project success. It should come as no surprise, then, that one of the most important uses of technology in project management is to ensure proper communication between managers, team members and other stakeholders. Innovation expect significance within the setting of venture administration due to more noteworthy challenges in today's technology-enabled work environment, where innovation instruments are routinely utilized for collaboration, communication, and development of venture administration hones. It is getting to be common hone for indeed co-located extend groups to utilize the electronic medium for these purposes. Regardless the significance of innovation, inquire about has appeared that it is troublesome to relate the utilize of innovation with commerce execution andthe nonappearance of such connection can be extrapolated to venture execution as well. (Conrad, 2019)

Technology assumes importance in the context of project management due to greater challenges in today's technology-enabled work environment, where technology tools are routinely used for collaboration, communication, and deployment of project managementpractices. It is becoming common practice for even co-located project teams to use the electronic medium for these purposes. Notwithstanding the importance of technology, research has shown that it is difficult to associate the use of technology with business performance and the absence of such relation can be extrapolated to project performance as well. However, technology can play a major role in supporting project managers in managing projects effectively and efficiently. Several studies have addressed the importance and leadership style of project managers. However, specific roles and responsibilities of a project manager toward the project team is an area that needs further study. In this research effort, using the literature review, important people-related factors of project performance are identified. Then structured personal interviews were used to gather data for understanding relations among these factors in order to develop a project manager performance model. (Anantatmula, 2008)

Having analyzed the role of technology in project management is enormous. Finance Sector and Cloud computing in PM take leading positions, where the value of devices is irreplaceable. By the way other sectors like Application Integration, HR, Customer relationship management **take from 24% to 42% of technology usage**. That’s means more that, half of project management task requires technologies in order to perform successfully. The role of Technology in project management is enormous, it helps users to transfer files in no time, change ideas with each other and ease the volume of project managers. (Anantatmula, 2008)

To conclude, in this chapter authors highlighted all definitions about ICT IT and project management technologies. As we know that, nowadays technology becoming more needed to people and also team which work strictly by deadline, with a lot of achieved goals and with different skills.

1.4 Risks in IT industry

The companies are facing some risks due to changes in a dynamic environment. It allows emerging new risks, both derived from the internal environment or the external environment of the company. If the risks are not managed properly, it will bring the negative impacts on the company's present and future (Talet, 2014)

One of the important functions of Information Technology (IT) is the governance of risk management. Risk management has been applied in various fields, one of which is an IT project. Risk management in IT project aims to provide a safe environment for IT projects. IT projects generally have a high level of risk. Risks are encountered in the financial risk. However, the risks that might occur in the implementation of IT projects not only the risks associated with the financial aspects, but also all conditions of uncertainty that may impact negatively or positively on the project objectives, including time, cost, scope of the project, or the quality of the project results (Talet, 2014)

Risk analysis ensures that the data warehouse team is working on the right risks. Risk analysis is the conversion of risk data into risk decision-making information. The risk is composed of two factors: 1) risk probability and 2) risk impact. Both factors are used for determining the exposure of a risk. Risk Probability. Risk probability is the likelihood that an event will actually occur. Risk probability must be greater than zero, or the risk does not pose a threat to the data warehouse project. Likewise, the probability must be less than 100 percent or the risk is a certainty. Risk Impact. Risk impact measures the severity of adverse effects, or the magnitude of a loss, if the risk comes to pass. If the risk has a financial impact, a value in currency can be the preferred way to quantify the magnitude of loss. The impact to the schedule of the data warehouse project (in man days) can also measure the loss by a risk. Risks can also be quantified by a level of impact where a subjective scale (i.e. from 1 to 5) rates the viability of project success. High values indicate serious loss to the project. Medium values show loss to portions of the data warehouse project or loss of effectiveness. (Talet, 2014)

Risk planning activities turn risk information into decisions and actions. Planning involves developing actions to address individual risks, prioritizing risk actions, and creating an integrated risk management plan. The goals of risk planning include reduction of the probability that a risk will occur, reduction of the magnitude of loss, or change of the consequences of a risk.

Risk Contingency Strategy. The idea behind a contingency strategy is to have a fallback plan in place that can be activated in case all efforts to manage a risk fail. For example, a new release of a particular ETL (Extraction, Transformation, Loading) tool is needed so that the data of a particular legacy system can be loaded into the data warehouse system, but the arrival of the tool is at risk. The data warehouse team might devise a plan to use an alternate tool or develop an own solution for the loading of the data. Simultaneous development may be the only contingency plan that ensures that the data warehouse system is implemented in time. Deciding when to start the second parallel effort is a matter of watching the trigger value for the contingency plan. Often the data warehouse team can establish trigger values for the contingency plan based on the type of risk or the type of consequence for the data warehouse project that will be encountered. (Talet, 2014)

# 2. Evaluation of information technology industry trends

2.1. Information technology industry development trends in Sweden

Firstly, information technology industry has made huge step in developing various spheres. As it was said before IT industries ease occupations, personal lives adding them more digital comforts like access global source of information. In the past it was complicated to get information, the main sources were radios, newspapers, ads. Nowadays it is possible to find out something in seconds. Secondly, during pandemic period IT industries attracted attentions of other businesses to pay attention, because starting from 2020 offline businesses had not survived, in this case the importance of IT industry is evaluated as a new level of doing business (kommerskollegium, n.d.).

GDP development of Sweden is higher than EU average compared, that means Swedish government provides pleasant opportunity to do business, especially IT industry, Sweden is one of the most technologically advanced countries in the world. The Information Technology industry consists of companies focusing on the development of software, hardware and digital IT services – such as international streaming services for music, development of computer games and digitalization of financial services. Sweden is the birthplace of many well-known global tech brands in various sectors that play a leading role in the world. Spotify, Skype, Ericsson, Electrolux, True caller, µTorrent, Klarna, Mojang, King, among others. It is an ever-growing industry with a great need for expertise. As per estimates, there are more than 50 companies having incomes more prominent than USD 10 Bn and approximately 250 companies with revenues more than USD 1 Bn, one of the best factors in Scandinavia. The economy of region is worth USD 1.53 Trillion and is appraised tall on straightforwardness and social uniformity record. (Picincu, 2022)

In 2021, the vast majority (94%) of EU enterprises with at least 10 employees and self-employed people used a fixed broadband connection to access the internet. Most EU enterprises were also present online: 78% had a website, 59% used social media and 22% had e-commerce sales (in 2020). (Eurostat, 2022)

Businesses' adoption of information and communication technology (ICT) offers the ability to improve services and products while also increasing competitiveness. It may have a significant influence on how organizations are conducted, affecting everything from how they organize their production or service providing processes to how they communicate internally and externally. (Eurostat, 2022)

This article presents recent statistical data on various aspects of the digital economy and society in the European Union (EU), with a focus on enterprise use of information and communication technologies (ICTs). (See figure 2.1)

In 2019, 87% of people aged 16-74 in the European Union (EU) reported they had used the internet during the previous three months. This share ranged from 98% in Sweden to 68% in Bulgaria. Internet use has grown rapidly over the years - in 2007 it stood at 57% and in 2013 at 75%. (See figure 2.2)

In conclusion the evaluation of IT industry has positive attitude from major parts of economy, jobs, daily life as it helps to ease people life. It's time for the industry to take the next step. There are tremendous benefits available through technology for both business and society, but there are major questions around safety, privacy, sustainability, and trust. The answers to these questions come from combining technical expertise with social awareness. By embracing responsibility for all the changes innovation can bring, the tech industry can be responsible for driving future progress. The shortage of IT skills is not just severe, but also widespread. To be successful, organizations require a variety of skill, achieve their digitizing objectives. This is due to the fact that there exist natural resources. Synergies exist between various IT talents. It's also due of the large number of options. IT talents are in high demand.

2.2 Assessment of legal requirements for information technology usage

List of legal requirements in Sweden for information technology usage: Platforms providers regulation, the principal consumer protection regulations that apply specifically to telecoms services, creators of computer software were enabled with Legal protections.

Platforms providers regulation: Bulletin Board System Act (Sw. Lag (1998:112) om ansvar för elektroniska anslagstavlor) and the GDPR are applicable. As a starting point, the person who publishes something in social media that is regarded as personal information is responsible for the personal information that the publication entails. The company that provides the platform may also be liable if the company has the ability to influence posts or determine which posts shall be published. (Svensson, n.d.)

In some cases, a publication may be covered by the so-called private exemption in the GDPR. According to the private exemption, the GDPR shall not apply to the processing of personal data carried out by a natural person in the course of a purely personal or household activity. If a person publishes personal data for a wider audience, for example by publishing pictures or other things in social media, then it is not to be considered a matter of purely private nature. This means that the private exemption does not apply and the person who publishes becomes the data controller for the publication. (Svensson, n.d.)

The principal consumer protection regulations that apply specifically to telecoms services: In chapter 5 of the Electronic Communications Act, the rights of consumers purchasing electronic communication services can be found. There are also provisions explaining the duties of the operators. Operators that offer their services to consumers must have their prices and general terms accessible for the consumers. It is sufficient to have them uploaded to the website of the company. Furthermore, the agreement between the consumer and the operator must contain clear and easily accessible details about e.g. the lowest level of quality offered, the measures taken to measure and control the traffic with the purpose of avoiding overloads of the net and how the measures can affect the quality of the services, and delivery time. An agreement between a consumer and an operator may not have a longer curing period than 24 months. (Svensson, n.d.)

Creators of computer software were enabled with Legal protections: Computer software and their creators are protected through several acts, the most relevant being the Patent Act, the Act on the Right to Employee´s Inventions, the Circuit Pattern Protection Act, the Industrial Secrets Protection Act, and the Copyright Act. Program codes per se are not eligible for patent registration in Sweden. A technical invention that is executed by software can however be patentable, thus resulting in an indirect protection of the software. (Svensson, n.d.)

Software will obtain copyright protection if it is original in the sense that it is an intellectual creation of the creator. In the event of an outsourcing of IT services, would any employees, assets or third party contracts transfer automatically to the outsourcing supplier?

No, not automatically. However, if an asset of a business according to section 6 b of the Swedish Employment Protection Act an IT service, which is deemed to be an “autonomous economic entity”, is being transferred, an employee working in that department might be transferred to the outsourcing supplier, unless he or she refuses. In practice, this is not an issue, since it tends to be solved by the involved parties. As for assets and third-party contracts, no transfer to the outsourcing supplier will occur. (Svensson, n.d.)

To conclude the measures referred to in the first subparagraph shall at least include the possibility: of restricting access to any document containing trade secrets or alleged trade secrets submitted by the parties or third parties, in whole or in part, to a limited number of persons; of restricting access to hearings, when trade secrets or alleged trade secrets may be disclosed, and the corresponding record or transcript of those hearings to a limited number of persons; of making available to any person other than those comprised in the limited number of persons referred to in points (a) and (b) a non-confidential version of any judicial decision, in which the passages containing trade secrets have been removed or redacted. In this part of the research authors show a specific legal act and requirements for IT in Sweden.

2.3. Information technology industry SWOT analysis

Seavus company is one of the developed and leading companies not only in Sweden but also in European Union. Its unique innovations, volume, and number of loyal customers have steadily increased. Below authors are going to describe the strength and weaknesses of Sweden companies.

Table 2.3

SWOT analysis of Sweden companies.

|  |  |  |
| --- | --- | --- |
|  | **Beneficial** | **Harmful** |
| **Internal** | Strength:  1. General infrastructure  2. Logistics performance  3. Knowledge workers  4. Knowledge and technology output  5. Knowledge creation  6. ICTs and business model creation  7. Online creativity | Weaknesses:  1. Project schedule delays  2. Sustainability risk to the organization.  4. Printing & other media, manufacturing  5. Applied tariff rate, weighted mean  6. Demotivation of the project team |
| **External** | Opportunities:  1. Innovation and technology development  2. Market development  3. Software developments | Threats:  1. Increasing competition  2. Innovations breakdown  3. Old technologies  4. Hardware and software failures |

**Strength:** Sweden has relative strengths in all GII pillars, except for Market sophistication. Three GII pillars are relative strengths: Infrastructure, Business sophistication, and Knowledge & Technology Outputs. In Infrastructure, the country has relative strengths in the sub-pillar General infrastructure and in indicators Logistics performance. In Business sophistication, where the country ranks 1st in the world, Sweden exhibits strengths in two of its three sub-pillars - Knowledge workers. In Creative outputs, Sweden exhibits strengths in the sub-pillar Online creativity and in indicators ICTs & business model creation. (Global innovation index Sweden, 2019)

**Weaknesses:** Due to overload work project schedule may delay because it requires more accurate work-step, to manage the goal. Other risks appear like sustainability risk to the organization, printing and other media, manufacturing. Big money transfers from other companies may delay that has an impact to the any company, because of the speed of bank transactions. All of these factors create some obstacles to a company.

**Opportunities:**

Development of Innovations and technologies, development of software and programs defense from cyber-attacks. It assists firms in distinguishing themselves from the competition by employing various creative marketing, production, and sales tactics. It assists businesses in dealing with uncertainty and being relevant in the face of adversity. It aids organizations in growing in challenging scenarios like the COVID-19 epidemic.

Market development is a business expansion strategy that entails marketing your existing products or services to a new set of clients. It all starts with market research, in a segmentation study of a current market. 1) Local direction and talent acquisition strategy

2) Local market information and data, as well as the competitive landscape...

3) Navigate to the Market sales and marketing framework.

A collection of computer science activities dedicated to the process of producing, designing, deploying, and maintaining software is referred to as software development. The set of instructions or programs that teach a computer what to perform is known as software. It is hardware-independent and allows computers to be programmed.

**Threats:** Increasing of competition of companies with good software skills and innovations. hardware and software failure - such as power loss or data corruption in SWOT analysis of information technology industry (See Tab. 2.3)

To conclude, The IT industry can drive future growth by accepting responsibility for all of the disruptions that innovation may bring. The IT skills deficit is not only acute, but also ubiquitous. Organizations need a wide range of skills to meet their digitization goals. This is owing to the existence of natural resources. There are synergies between diverse IT abilities. It's also because there are so many possibilities. IT professionals are in high demand.

# 3.Analysis of information technology in project implementation

3.1. Description of the selected companies in project implementation process

Nowadays information technologies have created the possibility of utilizing new ways to help the project managers to run the projects more efficiently and effectively. However, taking full advantage of this potential requires knowing the project management process, IT capabilities and the areas of project management that can be improved using information technology. (Care and Support Charging and Financial Assessment Framework, n.d.)

Seavus is a Software Development and Consultancy Company providing a full line of services in a software implementation lifecycle. Founded in 1999 in Malmoe, Sweden, Seavus successfully covers the international market from 17 offices in Sweden, USA, Switzerland, Macedonia, Serbia, Belarus and Albania. (dun&Bradstreet, n.d.)

Seavus uses 29 technology products and services including HTML5, Google Analytics, and jQuery, according to G2 Stack. Seavus is actively using 76 technologies for its website, according to BuiltWith. These include Viewport Meta, Mobile Compatible, and SPF.

Table 3.1.1

**“Seavus project viewer” implementation process**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Project Phase** | **Task** | **Effort (days)** | **Resource Type** | **Deliverable(s)** |
| All phases | Project Management | 60 | Project Manager | Project Plan, Resource Plan, Change and Risk Logs etc. |
| Design | Created detailed design document with high level design. | 20 | Solution Architect | Design Document. |
| Analysis | Functional requirements for login module. | 10 | IT Analyst | Functional Specification for Login, Admin and Reporting Modules. |
| Functional requirements for Admin module and Reporting module. | 15 |
| Build | Build and Test basic application framework. | 15 | Developer | Software Release Bundle. |

Table 3.1.1 Continued

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Build and Test Login and Admin module. | 30 |  |  |
| Build and Test Reporting module. | 10 |  |  |
| Testing | Create Test Plan | 4 | QA Analyst | Test Plan  Test Matrix  Test Cases and Defect report on regular basis. |
| Create Test Matrix and Data | 6 |
| Test Cases and Testing | 10 |  |  |

The Seavus project viewer project implementation plan has shown above, indicating all the necessary project phases and important tasks that were done during the development of a plan. In addition, necessary working position and employers responsibilities in an accomplishment of an important task. (See tab. 3.1.1)

Author’s second selected company is **ElastX,** is a public cloud provider based in Sweden. Sweden is highly progressed in IT and deliver truly automated cloud services via own platforms OpenStack IaaS and Jelastic PaaS. At ELASTX provides customers with a redundant infrastructure reaching across 3 Swedish data centers, with 100Gbps network capacity and the ability to deliver bare metal servers fully automated.

Table 3.1.2

**“OpenStack” Implementation process**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Project Phase** | **Task** | **Effort (days)** | **Resource Type** | **Deliverable(s)** |
| All phases | Project Management | 45 | Project Manager | Project Plan, Resource Plan, Change and Risk Logs etc. |
| Design | Created detailed design document with high level design. | 14 | Solution Architect | Design Document. |

Table 3.1.2 Continued

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Analysis | Functional requirements for login module. | 3 | IT Analyst | Functional Specification for Login, Admin and Reporting Modules. |
| Functional requirements for Admin module and Reporting module. | 3 |
| Build | Build and Test basic application framework. | 4 | Developer | Software Release Bundle. |
| Build and Test Login and Admin module. | 5 |
| Testing | Create Test Plan | 2 | QA Analyst | Test Plan  Test Matrix  Test Cases and Defect report on regular basis. |
| Create Test Matrix and Data | 4 |
| Test Cases and Testing | 10 |  |  |

The implementation of the **ElastX** project phase has been explained above showing the important phases and processes that was necessary to develop a project plan. Also, workers position accomplishing the important tasks during the 45 days project creation. (See tab. 3.1.2)

3.2. Recommendation and survey for information technology using in project implementation

Overall, Authors are going to explain an essential stages of working process in project implementation and give recommendation to necessary part of the project that beginning with the Designing the Document and finishing by testing the work done by the professionals. With the aim of increasing the profit and minimizing the expenses of the chosen companies from Sweden.

To begin, Project Managers arrange the total scheme for the project and then plan the resources that are needed as well as work out whether changes are required or not and analyze the Risk Logs. In most of company managers work from start till the end and get highly paid for the whole process. In Seavus company as an example from the 60 days project they get paid for whole period. Authors suggest to them to attend the main parts of the project fifty percent (50%)

Following this, detailed design is created to the project in high level by Solution Architect in 20 days. And IT Analyst creates analyses of functional requirements for login the module. The authors recommend using modern tools like Epson® Projector Management SoftwareandCollaborative system design that give colors meaning - showing multiple perspectives, visualize the evolution of your design decisions Speed up onboarding and knowledge transfer without handholding and as an example is a simple, Windows-based solution for monitoring and managing your networked projector fleet. This useful application, a free software solution with no license fees, allows users to configure, operate, and monitor up to 2,048 networked projectors at once, saving crucial time and reducing downtime. Epson Projector Management Software, ideal for IT professionals managing multiple displays or display groups, ensures that your projectors are ready to display whenever and wherever needed. Also, assist to control and monitor the status of projectors remotely. Schedule and set-up automatic email alerts for projector maintenance intervals or error notifications as well as automatically power-on and display messages to networked displays via the Message Broadcast feature that will minimize the work for fifty percent (50%). (E\pson, n.d.)

In the following stage developer builds and test basic application framework login and admin module. Most of the Swedish companies use old version of coding system called “Sublime” that requires to add and write all the codes. For recommendation it would be better if they use tool named “Ultra Edit» that would memorize most used codes that would also hugely decrease the time for accomplishing the task for (45%)

Furthermore, QA Analysts use the latest version that is one of the positive sites of Sweden companies and takes 16 -17 days depending on the project.

In general, as above-mentioned authors suggest using modern apps and tools by saving valuable time and helping to minimize the excess of workforce. Also, would serve to minimize office outcomes and increasing the advertisement so as to rise the number of users that will effect the net profit of the company.

Table 3.2.1

Questionnaire Ranking of ICT usage in Seavus company by different workers

|  |  |  |  |
| --- | --- | --- | --- |
| Benefits | 1st Group | 2nd Group | Overall |
| Video conferencing platforms | 4 | 5 | 5 |
| Gantt Charts | 4 | 3 | 4 |
| Social media | 3 | 5 | 4 |
| **Global Diversity & Inclusion** | 5 | 5 | 5 |
| Project management tools | 5 | 4 | 5 |
| Digitalization | 5 | 4 | 5 |

As a result, in 21 April in 2022 authors made a questionnaire survey from various employees from different working positions as well as diverse working experience in Seavus company in Sweden. The respondents were asked to rank the benefits on ICT usage in project management and methods to encourage ICT usage ranking with points from 1-5 points (5-Strongly Agree, 4-Agree, 3- Neutral, 2-Disagree and 1-Strongly Disagree). In total of 17 questionnaires were collected out of the 20 sets distributed.

The respondents comprised of 8 personnel with work position of programming and designing, 4 project designer and managers, 3 contract manager, and 2 accountants. The personal details and company information of the respondents were not collected to ensure the guarantee of anonymity and confidentiality. There are 8 respondents who have working experience of 2 to 5 years, almost half of the total respondents are belong to this category. There are 5 respondents who have less than 2 years working experience and followed by the group of having 10 year experience, which there are total of 3 respondents belong to this category. Lastly, there are only 1 respondent who have 6 years of working experience.

It was found that there were common agreements between two groups of respondent towards the top three benefits of ICT adoption. Both respondents from web designers and consultant rated that the improved accuracy and preciseness of work done brought by different kind of software was the most beneficial results by adopting ICT. According to Autodesk, as well as WIX software allowed Web designers to build webpages using HTML tags that define the content and metadata of each page. The layout and appearance of the elements within a webpage are typically defined using CSS, or cascading style sheets. (See Tab 3.2.1)

A project management application allowed workers to keep track of all their activities and projects in one location. As they are web-based, highly interactive tools helped greatly for planning workers to complete their project from start to finish, managing their project's schedule, and collaborating with their virtual team.

To conclude, the usage ofICT promotes employee communication, automates numerous corporate activities, and increases project transparency. This will improve the satisfaction of clients and staff happiness, raise profitability, and allow companies that implement it to develop.

3.3. Financial assessment for developed recommendations

In financial part authors calculate two various projects of “Seavus” and “ElastX” companies. Projects with the name “Seavus project viewer” as well as “OpenStack” project.

Seavus project viewer is a project management software that is designed to assist users team members, team leads, project stakeholder and other project participant to review their project assignments, print the project information and follow the overall project status. (seavus, n.d.)

OpenStack is a cloud operating system that manages and provisiones huge pools of computing, storage, and networking resources across a datacenter using APIs and standard authentication methods. (Software, n.d.)

Table 3.3.1

**Financial part of projects with recommendations by authors**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project name: “Seavus project viewer”** | | |  |  |  |
| **Budget Item** | **Daily rate** | **Total Budget** | **Duration (days)** | **Authors suggestion (Days)** | **Authors suggestion (Total Budget)** |
| **Salaries** | | | **60** | **50** |  |
| **Manager** | **100 Euro** | **6.000 Euro** | **60** | **25** | **2.500 Euro** |
| **Project designer** | **91.66 Euro** | **1.833 Euro** | **20** | **10** | **916 Euro** |
| **Programmer** | **150 Euro** | **3.750 Euro** | **25** | **15** | **2.250 Euro** |
| **Graphic designer** | **120 Euro** | **6.600 Euro** | **55** | **25** | **3.000 Euro** |

Table 3.3.1 Continued

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QA Analyst** | **130 Euro** | **2.600 Euro** | **20** | **10** | **1.300 Euro** |
| **Expenses** | | |  |  |  |
| **Office outcomes** |  | **12.000 Euro** |  |  | **8.000 Euro** |
| **Advertisement** |  | **3.500 Euro** |  |  | **6.000 Euro** |
| **TOTAL EXPENSES:** |  | **36.283 Euro** |  |  | **23.966 Euro + (bonuses)** |
| **Project name: “OpenStack”** | | |  |  |  |
| **Budget Item** | **Monthly rate** | **Total Budget** | **Duration (days)** | **Authors suggestion (Days)** | **Authors suggestion (Total Budget)** |
| **Salaries** | | | **45** | **30** |  |
| **Manager** | **100 Euro** | **4.500 Euro** | **45** | **15** | **1.500 Euro** |
| **Project designer** | **91.66 Euro** | **1.375 Euro** | **25** | **15** | **1.375 Euro** |
| **Programmer** | **150 Euro** | **5.250 Euro** | **35** | **25** | **3.750 Euro** |
| **Graphic designer** | **120 Euro** | **4.800 Euro** | **40** | **30** | **3.600 Euro** |
| **Expenses** | | |  |  |  |
| **Office outcomes** |  | **10.000 Euro** |  |  | **8.000 Euro** |
| **Advertisement** |  | **4.000 Euro** |  |  | **5.000 Euro** |
| **TOTAL EXPENSES:** |  | **29.925 Euro** |  |  | **23.225 + (bonuses)** |

The calculation part of two projects done by experienced professionals of Sweden companies. It required 8 weeks to complete the project with a total expense 36.283 Euro. With the recommendation of authors, the outcomes will witness a gradual decrease in expense 23.966 Euro, however the result has not changed but improved. The calculation part of company “ElastX” regarding the implementation of a project with the name “OpenStack” with duration of 45 days. But with the suggestion of authors the workers will have an opportunity to finish early than the period of previous project with total expense of 23.225 Euro plus 3000 Euro bonuses for employees to accomplish their worker. Total expense for the 2nd project company spent 29.925 Euro (See tab. 3.3.1)

As an example of one given project by authors, Seavus project viewer was created in 2018 year and return cash in 12 (twelve) months because this program is free for one year for companies, then it is 88 Euro for companies and 29 Euro for individuals. Currently, more than 6 million users. Used data source (company, n.d.)

To conclude, Authors calculated the all vital expenses that are important in creation of the projects from the start to the final part of project. Also, developed a project implementation plan including all the necessary working positions and tasks that should be done as well as the days required for accomplishing the projects. Furthermore, compared two different company’s projects that has been calculated and described all the work processes that done during the project. And improved the project to minimize the time, however, to increase the profit.

# Conclusions and proposals

Based on the performed research and calculations, the authors draw the following **conclusions**

1. Project managers may ultimately automate many areas of their tasks with the aid of the suitable ICT project management solutions.
2. From numerous devices, managers will be able to manage staff, assign assignments, and track project success. It will be able easy to decentralize communications and communicate with clients or remote staff without incurring phone call costs. Most significantly, these modern technologies will strengthen workplace cooperation, which might result in considerable increases in worker productivity.
3. Individuals, institutions, and society as a whole gain immensely from information and communication technology. Safety, data privacy, sustainability, and trust issues can only be addressed by combining technological competence with social and environmental understanding. As a result, all ICT users must be prepared to accept responsibility for all of the changes that innovation might bring.
4. The top three most significant benefits mentioned by respondents are centered on the correctness of work done, minimizing paper use, and ICT allowing team members to share the most recent information in the shortest amount of time. This clearly supports the necessity of work quality, cost allocation, and time management in all projects, regardless of the type of the business or sector. Professionals' desired advantages were nearly same, with the goal of ensuring project success within the specified budget, time frame, and also realizing the customers' objectives.
5. Computer software and their creators are protected through several acts, the most relevant being the Patent Act, the Act on the Right to Employee´s Inventions, the Circuit Pattern Protection Act, the Industrial Secrets Protection Act, and the Copyright Act. Program codes are not eligible for patent registration in Sweden.

Based on the above conclusions, the authors of the study paper consider it possible to formulate the following **proposals:**

1. Improving and increasing the number technologies for its website including Viewport Meta, Mobile Compatible, and SPF as well as products and services including HTML5, Google Analytics, and jQuery, according to G2 Stack to increase the efficiency of the work.
2. In addition to the first proposal companies should also work in improvingthe expertise and support in identifying and protecting the violation of formal security policy. Furthermore, to develop best security programs from external viruses and cyber-attacks.
3. A staff of highly responsible, experienced, and IT professionals are the target for the recruitment of company personnel to increase the efficiency of the company’s work to gain more profit.
4. Companies should decrease expenses by cutting from office outcomes and invest more on advertisement, that helps the companies to attract customers as advertisement is key role for every business. In this case authors analyzed and concluded that both companies invest less money on advertisement rather that supplies.

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