Information Systems Methodologies

Assignment 1

Systems Analysis

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1. **INTRODUCTION**

I will start this report by discussing the origins of the Systems Analysis based on my findings and also look at how the term is used in the different environment. Most authors elaborate in finding the general term, which has importance with regards to their own examinations as the term permits such in conclusion limits. In the definition section of the report, I will look at numerous interpretations of the term presented by various authors and also compare them based on their views. Before looking at a specific application, I will be general as possible about the origins and definition of the term. Then I will look at how the term has been applied together with reasons for implementing system analysis in a certain environment and by which the implementation proceeds. It is important to say that the list of applications I will look at is not final. Its goal is to show examples of how system analysis is being used in various sectors. The report ends with an evaluation of how system analysis is being applied in different sectors and also looks at their advantages and disadvantages.

1. **EVOLUTION OF SYSTEMS ANALYSIS**
   1. **HISTORY**

The beginning of system analysis can be followed back during the World War II when operation research was used by the Britain military. Operation Research is a method that helps analyses ways of solving problems and decision making that will be useful in the management of the organization. At the end of World War II, operation research was widely spread around the civil sector which was widely used in societies and industries. Interestingly, with operation research, system analysis manages fewer limitations hence there are more available choices of decisions. Through the use of system analysis and operations research in the early 1970s, Structured Analysis was created. Structured Analysis is a software engineering technique that makes use of graphical diagrams to portray and develop the system specification that is easily understood by users. By this time, the use of programming in the business industry became more common and systems started becoming bigger, difficult to handle and more complex. Due to the lack of assistance on programming, design techniques and document requirements, the first generation of Structured System Analysis and Design Methodologies was created.

In 1996, Tom Ritchey presented studies performed by Bernard Riemann who analysis and synthesis scientific methods in his work entitled "The Mechanism of the Ear". Where he presented a better method for studying a certain subject and considering a wider application. In his article, Ritchey defines analysis saying: "Analysis breaks down a complex system into small components." (Ritchey, 1996, P. 1) .Ritchey focuses on synthesis being a scientific method which goes parallel with analysis and says that you cannot do analysis without synthesis because they complement each other. As defined by G. W. Leibniz in Ritchey's article "Synthesis is a process in which we begin from principles and build up theorems and problems, while analysis is a process in which we begin with a given conclusion or proposed problem and seek the principles by which we may demonstrate the conclusion or solve the problem"(Ritchey, 1996, P. 16) .

I find this article suitable for my report because, in B. Riemann's work, he breaks down the entire system so as to perform analysis on every component that the system has to offer which constitutes the philosophical approach to system analysis.

* 1. **Definitions**

There are many definitions of the term System Analysis, in this section, I will look at some definitions perceived by some key system thinkers; therefore it is subjective in this regard. Most definitions are similar but others are also contextualized within a domain as perceived by the author. A most basic definition by Merriam-Webster is that "System Analysis is an activity in order to define its goals or purposes and to discover operations and procedures for achieving them accordingly."(Merriam-Webster, 2004). In my opinion, this definition serves as the control part for other definitions without going into details.

The International Institute for Applied System Analysis (IIASA) says that Systems Analysis is not synonymous with modelling, not about showing weakness and it is not scientific or mathematical in nature.

IIASA defines System Analysis as being a problem-solving process in which many people participate, scientists of relevant disciplines stakeholders and decision makers. These are problems along with all the concepts and factors they encompass"(Hordijk, 2007).

Boucher and Quade interpret the definition by admitting an absence of a formal definition and go on to define System Analysis as "A systematic approach to help the decision maker decide on a course of action by thoroughly looking at the problem, looking out objectives and alternatives and comparing them so as to understand their consequences using a suitable framework so far as possible analytic so as to bring expert judgement and instruction to bear on the problem" (Quade & Boucher, P2).

Comparing Boucher and Quade's definition with the IIASA, they are quite similar but differ in a key way. In my view, IIASA looks at it in a more realistic and more common nature of the System Analysis while Bouche and Quade give the impression of narrowing only the worldview of a single individual. Hoag explained System Analysis by stating the non-existence of a precise and mostly accepted definition. Hoag's definition goes as follow "System Analysis is a systematic examination of a problem of choice in which every step of the analysis is made explicit if possible"(Hoag, 156, P. 2).

Looking at these definitions, it is difficult to align various worldviews and the wide usage of various methodologies.

Hoag points out that the tacit knowledge a system analyst gets by analyzing a system should be with much details as possible. This is useful because it allows us to have a basis for a common discussion about problems that needs to be solved.

Each definition explained in this section, looks at different aspects and can all be as correct when looking at them in the context that they were given.

* 1. **Application, Objectives and Methodologies**

Many different aspects have been focused on during the research of System Analysis. Looking at Lippert and Anandarajan's article published in 2002, it even differentiates between research done by practitioners and academics based on the System Analysis. Therefore, they concluded that it clearly depends on the author's background. Looking at their conclusion, it says that academics strongly focus on the planning of analysis while practitioners prefer to investigate methods and tools. But both groups did not perform any research on the contextual or cultural aspects that can influence an analysis. As seen in the previous section of the report, there is a widespread definition for the term System Analysis. The implementation and execution of the methodology clearly depend on where they are applied. This means that the limitation of what System Analysis should include also depends on the author's point of view.

I will discuss examples of some various form of application in different environments.

* + 1. **International Institute for Applied System Analysis (IIASA)**

The most useful part of successfully analyzing a system; it is by including and combining all the worldviews of the different managers.

IIASA was created in 1972 by 12 different representatives from different countries; of which the United State and the Soviet Union were the two leading countries in the process in which illustrates the capabilities of reconciling two very opposite world views.

The aim of it was to approach global social-economic and environmental problems by bringing together various political points of views as well as scientists and experts from different sectors. (International Institute for Applied System Analysis, History of IIASA).

Many worldviews wanted to be included while dealing with global problems. One of the famous books in System Analysis called "Handbook of System Analysis" written by Quade and Miser which was sponsored by the IIASA organization. (Hordijk, 2007, P. 14). Even though they said that System Analysis does not have a specific form and is basic a few changes as systems always show signs of change too.

Quade and Miser have defined nine steps that can be used as a guideline for a system analyst to successfully analyse a certain system. (Hordijk 2007, P.15).

* Data Collection: this is the process of gathering information through existing knowledge, doing research or interviewing people that have the knowledge of the system that has to be analyzed.
* Determine goals: This is the process whereby the purpose of the system is discovered.
* Develop possible solutions: this is the process of listing out various improvements from the problems that have been discovered.
* Reconsider problems: Analyze the gained knowledge and plan on how to fix them.
* Evaluate the consequences of listed solutions: this is the process of analyzing different solutions so as to discover how they will improve the system.
* Comparison of various solutions: this is the process of examining different solutions discovered so as to know if they align with one another.
* Make results available to everyone involved in analyzing the system: this is the process whereby the result of analyzing is being made available to the analyzing team.
* Follow-up assistance: this is the process whereby the analyzing team is being followed up to make sure that they understand the result.
* Final evaluation: this is the stage whereby a summary of the findings is being summarized.

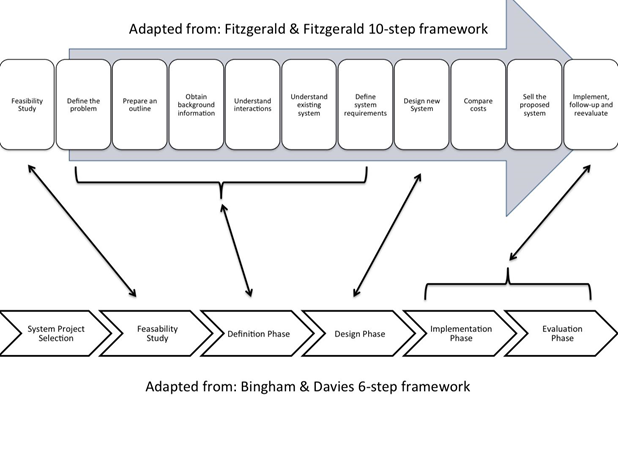
In this report, I will also talk about two other frameworks so as to show how executing a system analysis can be different but also add some aspects and other details to them. This can also be seen under the aspect that a certain situation can have an impact on the framework of the System Analysis; and also the system should have appropriate variety. But at the end, they all have to follow the basic structure of analysis and structure.

The IIASA uses many quantitative and qualitative methods while analyzing a system so as to profound evaluations. But also developing tools falls under the process because there are not always available methods in order for the analyst to successfully analyze a situation.

* + 1. **Analyzing Business Processes**

One of the most complex and common systems are organizations. In this section, I will talk about 2 different types of system analysis in the environment of an organization. According to Fitzgerald and Fitzgerald, a systematic approach is widely recommended because it provides a guideline on how to get to the root of faced problems within the organization and also how to solve them by redesigning the system. Looking at the Analyzing Business Process, it again shows us the combination of analysis and synthesis. When comparing ABP with the IIASA, in the IIASA they show that before performing a considerable analysis and design, a feasibility study needs to be performed so as to save time and money. (Fitzgerald & Fitzgerald, 1973, P. 3). According to Fitzgerald & Fitzgerald, to successfully analyses a system, they have created ten steps as a guideline (Fitzgard & Fitzgard, 1973, P23) While Bingham & Davies propose six steps of which project selection is the first step. (Bringham & Davies, 1978, P. 5). Just as the IIASA provided their guidelines on how to approach system analysis even though they are some similarities, but they are some different steps which will be illustrated in the image below.

**Image 1 – Comparison of systems analysis approach by Fitzgerald&Fitzgerald and Bingham&Davies**



Adapted from (Fitzgerald & Fitzgerald, 1973, P. 23) (Bingham & Davies, 1978, P. 5)

There are some similarities in these approaches with the System Development Life Cycle also known as SDLC which is mostly used by companies when developing an Information System. The first SDLC approach was created in the 1960s by the National Computing Centre in the UK. (Avison & Fitzgerald 2003, P. 19). In this approach, the steps are referred to as the Waterfall Model or the Classical System Analysis of which these steps are:

- Feasibility study

- System investigation

- System Analysis

- System Design

- Implementation

- Review and Maintenance

(Avison &Fitzgard, 2003, P17)

* 1. **Analyzing IT Systems**

In this section, I will talk about other methods that can be used to analyses a system to the classical waterfall approach whereby a step by step introduction to analyzing the system is being followed. In the development phase, these methods are based on the continuous feedbacks and the object-oriented programming. I will include some examples of IT Systems because it is a domain which benefits the most from the application of the system analysis methodologies. Therefore, I will not omit a brief overview of methodologies specific to this domain.

The development of IT Systems includes an analysis phase of which some useful analysis methodologies namely:

- Structured Analysis

- Object-Oriented Analysis

- Agile Methods.

(Shelly & Rosenblatt, 2012, P. 22)

The previously mentioned technologies are not the only methodologies that one can use; other methodologies can be identified and implemented depending on the analyzed system with the goal of getting a better perceptive of it. Some organizations may also create their own methods and techniques which mean, there is no common methodology which can be applied every time when analyzing a system. It is important to know that the methodology choice clearly depends on the analyst current view of the system.

* 1. **Evaluation**

In a nutshell, I can state that System Analysis give us an understanding of complex systems by using analytical, scientific methods from different subjects. (Quade & Boucher, 1968). It helps with making assumptions and expectations so that all top managers involved with the system should have a similar basis for discussion. (Enserink, Hemans, Kwakkel, Thissen, Koppenjan, & Bots, 2010, P. 52). It helps align various worldviews of these top managements which could be seen as a step to the objective.

This is similar to the idea in Socratic dialogues where he tries to discover the truth by comparing point of views in critical ways to reach an objective.

System Analysis enables the organization to make long-term plans in Systems that has uncertain future perceptive instead of having a short-term reaction to occurring problems. (Quade & Boucher, 1968)

1. **Conclusion**

Throughout the investigation of Systems Analysis, I discovered that the term is difficult to define because systems are developed for people where a point of view plays a big role. Even when limitations are identified, there are changes in perception even if there is a single point of view because it is believed that the single point of view can change with the addition knowledge of the system. Looking at small & simple systems, boundaries may be easy to identify but system analysis is not always applied. After analyzing various applications of System Analysis, I am able to understand how different organizations summarize the term with some extra methods to give it more understanding meaning within their own context which can be a methodology or something else systems analysis was a wide approach to how it can be executed because the variation of factor found within the system properties. System Analysis encapsulates many various qualitative and quantitative methodologies that can be useful for analyzing of which the system analyst has to choose most relevant for the work in hand.

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