Journal of Physics: Conference Series

PAPER • **OPEN ACCESS**

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To cite this article: Mahyuddin K M Nasution *et al* 2019 *J. Phys.: Conf. Ser.* **1235** 012115

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IOP Conf. Series: Journal of Physics: Conf. Series **1235** (2019) 012115 doi:10.1088/1742-6596/1235/1/012115

Design of the research problem statement

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Abstract. This paper aims to provide an understanding of designing a problem statement that must be present in every research proposal or other scientific work. A study, from proposals to scientific papers, requires a problem statement. The design of the program statement is basically always present from research interests. Objectives as a translation of the problem statement will be described through a methodology that matches the answers to be given to the interests. In the industry 4.0 era, problem statement in research prioritize innovation or change to improve welfare.

1. Introduction

The problem statement in a study is the disclosure of the research interest carried out both from an academic point of view and from a non-academic point of view [1, 2, 3]. The importance of something that needs to be researched is related to important things that need to be disclosed and is the main reason for the research be carried out [4], usually this is stated in the first part in scientific work or research proposal [5]. Sometimes related statements are arranged in such a way as in the introductory section (introduction of problem statement) as the background to the problem statement [6, 7].

Understanding the ins and outs of presenting a problem statement will prevent a scientific work from fulfilling only a portion of the research interests, so that studies related to it can then be proven true or implemented [8]. Indepth completion of a study will provide benefits for the knowledge development [9]. This paper aims to describe the design of a problem statement in research based on research interest. Thus, systematically this paper consists of: After the introduction, the section about the definition of the problem statement as the initial review, the approach section used to understand the problem statement, and then before the conclusion is the declaration of the problem statement.

2. Definition of problem statement

The problem statement is stated as a sentences that will be proven true or false, and not just questions need the answers to the problem, because it terms of a statement is a sentence of true value or false [10, 11]. A statement is not a question sentences, where a question only requires an answer but not a solution let alone proof. Not a few academics who do not understand what is called a problem statement, so often found a research proposal and a problem statement expressed as the questions. The term problem statement is sometimes also recognized as the

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problem formulation [12], which means that the problem statement is a series of words that are arranged systematically in the flow of reasoning which expresses the reason for the importance of a research [13].

Both in the proposal and any scientific work, the problem statement is delivered in such a way in the introduction section [14]. For example related to the case of disruption as an information technology implication that is: (s1) *Many companies as a series of business houses with a number of shops in almost all countries in the world.* (s2) *Many people see that such business houses are traditional taverns where customers drop by, make orders, pay cash or use credit cards, and continue with their other activities.* (s3) *The last thing that many people think about is the use of information technology in their business.* (s4) *Many business houses become digital based companies or turn into social companies.* (s5) *A bit of a series of business houses then tried to attract young people with the convenience of free Wifi, and then several business houses started several digital initiatives to become truly technologically savvy companies* [15].

Sentences (s1-s5) above are the background of the problem statement which is systematically presented in the introduction to the proposal [5]. The reality revealed in the sentence (s1) is the reality of the current business world or there is such a company [1]. Sentence (s2) expresses the views of others based on assumptions that can be observed by researchers from various mass media news, which reveals that there has been a change in the business environment due to the use or application of information technology [16, 17]. Therefore, the sentence (s3) is a conclusion sentence that is generally taken by the entrepreneurs, which is realized in sentence (s4) and results in the sentence (s5) as a way out, and all this has an impact on the problem, which is expressed in the following problem statement: From 2007 to 2009 the company's operating income declined sharply. This decrease was caused not only by the economic slowdown, but also by intensified competition intensified even during the recession. Excellent product quality improvement and the provision of excellent services helped to remain only in the short term, a better solution is needed. Better interaction with customers or stakeholders is needed and decides to solve this problem through the involvement of information technology [15].

3. An approach to understand the problem statement

Personally, a researcher feels that there is something that is lacking or inappropriate: Relating to the behaviour of social actors, business actors, or the government; Disharmony in the social community; Social or economic inequality, inaccurate application of technology, and others [18]. Based on the discrepancy, a product is sought (whether it is hardware, software, or technology in the form of technology or not) that specifically meets those needs [19]. If the specifications available do not meet these needs, then a product is sought functionally which has almost the same use [20]. Each function must be measured first in terms of resources, capital, selling power, and possible payback period [21, 22].

Not all the need to answer the problem is available properly, and based on importance it is necessary to systematically compile the nonconformity at the most abstract level or theory to a system of rules [23]. Certain answer to nonconformities in theory begin from systematically down-streaming in order to touch social or user targets [24], or be recognized also as a benefit diagram and the consumer suffering [25]. However, this is based on evidence of the availability of capabilities in reality. Of course, to realize the evidence must be understood matters related to it, namely about stakeholders, content, processing, management, testing and evaluation, results or products, research/development and downstream [26]. This is all related to resources. The most important stakeholders are experts or resource persons who guarantee basic needs for the problem. This is to state that the settlement given is feasible. Of course, such stakeholders can demonstrate with evidence that the settlement is in accordance with the requirements [27].

4. Declaring the problem statement

What can be understood from how to understand the problem is that the problem must have an answer according to the level of need [28]. The problem statement must be adjusted accordingly. Therefore, to build a problem formulation must be based an in-depth study [29]. The study that must be carried out is related to scientific foundation related to nonconformities that are the source of the problem statement [30]. A review of nonconformities that do not have a scientific basis requires a problem statement relating to the intended scientific foundation [31]. This is stated as the basic research. Basic research is generally to quantification, which is a description of something, with reasons and evidence related to it [32].

In many interests, for example, it needs to be proven that between objects or entities having a relationship (then simply state the entity) [33]. However, to present a relationship between entities, a description of the relationship between entities is needed from the definition, category characteristics, and to the evidence of its existence [34]. This is all related to data and related information [35]. That way, however, based on the generation of memberships functions, theoretically and the implementation of fuzzy sets will group each entity into its collection, and eliminate any possible relationships [36, 37]. Relationships for example are expressed more firmly in the network [38]. A description of this relationship further requires measurement, which is derived from its categories and characteristics [39].

Measurements need to be clearly expressed both in the model, method, framework, formula, tool or metric [40, 41]. One form of proof of a relationship between two entities is through similarity [42], which is often used in social network extraction [43, 44]. Mathematically, it is proven that there is a form of relationship that has similarities [45]. Then, a study of information sources or data needs to be stated [46].

Each data set has its own characteristics, especially the fulfilment of the requirements to be representative of the population, namely the data sample [47, 48, 49, 50]. Testing of the characteristics of data has always been one of the domains of research both in terms of statistics [51] and data science [52]. In addition, dynamic and static information provides different opportunities in expressing a problem [53, 54]. Static data is closely related to classification and learning problems [55], while dynamic data is related to growth and trends expressed through clustering together predictions [11]. Therefore, the problem statement related to the relationship between entities has many formulas, which can be done in stages starting from the most basic level, applying, used in the industrial world, and used to improve the welfare of the community [56].

Starting from that, the problem statement in research is always closely related to the interests of a community, nation, state, social, economy, and others [57, 58]. Scientifically, the statement of problem presents indirectly the framework bridged by the meaning (state of the art) and then gives rise to the objective of research. Therefore, each study requires a methodology that is implemented quantitatively or qualitatively as well as both [59]. The empirical research will force entry into the realm of being quantitative and qualitative at the same time [60]. In this case, all questions related to qualitative need to be answered: what, who/whom, where, when, why and how (or 5wh) as well as answers to the extent. While how much, how many and so on are categorized into qualitative [61]. This certainly proves that interests are the focus of each formulation of problem. However, philosophically each study presents more essential interests, not all problem statements are worthy of being expressed as part of the research, when a problem becomes unlimited for example it must be calibrated with a border, scope, or framework [62]. So each research belongs to the background of the formulation of problem which unwittingly continues to be try to reach the core of research, namely prosperity and again welfare [11, 63].

In particular, the importance of conducting research from all fields of science today has a clear direction, where it converges to information technology as the results of disruption and diversity [64]. Today, many businesses are no longer trying to develop human resources in the

economic fields, but prioritize people related to information and computer technology, exact sciences, and psychology [65]. Of course, it has its own reasons as an interest. Even so, issues related to Indonesian workers who are in the position of a low human development index (HDI) led to the presence of a problem statement [66]. Its importance lies in the fact that even through the current generation is literate with information technology, especially wages, but both the younger generation and their parents only have expertise as technology consumers [67]. They are not able to use information technology properly to improve their welfare, as a result of not mastering the related science that bridges their life needs with the means available in information technology [68, 69]. After all, in general, the low mastery of knowledge causes the philosophical underlying every science or technology will not be captured by generations who only have the desire to be users. Thus, research after research requires statement of problems related to all interests that focus on the involvement of information technology [70].

A research target is end part of the research report (conclusion). A well-recognized target can be a source of information to present objectively in reverse by which the methodology works to achieve that target [57]. Based on the literature review as supporting to it, the problem statement summarizes all possible objectives to cover research interests [71]. Thus, a formulation of the problem does not present perfectly unless the research interests are sharpened by literature reviews, and to get novelty or innovation, the formulation of problem must be translated into several objectives that end up being targets or suggestions [57].

The research interests can exceed the target, even though the target is targeted to achieve interest. For example, the interest of a study is carried out by many researchers not only to get work but to solve a number of community problems, or a student once completing the lecture can work independently [66]. Today, in the industry 4.0 era, a student no longer thinks about just how he/she graduated, but how after that work or open job opportunities. Industries established are no longer based on the interests of seeking profits by those who are able to make factories, but are based on the ability of innovation. Industry is established on a market model to meet the needs of many people. These needs can be briefly changed according to the interests of the community, and all of that is now in big data centre like Facebook.

An information technology graduate candidate will think about opening a business related to the needs of the community in his environment first, where the needs that change dynamically [72, 73]. Of course, to get information about that need, it is enough to explore changes in the habits of community members from within the social networking system. Fulfilment of these needs is in the interest of research, which is expressed further into a problem statement in a study. Of course, the problem formulation for information technology research is different from other fields of science. This formulation is related to the focus of the scientific field as pressure, of course to marry off the intended target with the scientific field into something to present findings or novelty, through teaching and learning [74, 75, 76, 77].

Innovations that may be discovery or invention can be developed by and at a university (Universitas Sumatera Utara for example) in accordance with planning and competitive if they pay attention to their environmental needs [78]. TALENTA which is the concept of developing the strength and potential of research based on technology, culture, art, resources, and the environment available in Sumatera Utara Province, Indonesia [79, 80]. This concept can be developed if the research carried out reveals the relevant interests and lowers them into problem statements. Although the study of the scientific field remains the same, but by marrying off it with its potential, the possibility of new finding and avoidance of research outcomes from imitating or plagiarism [81]. In this case, local capabilities become part of knowledge development.

5. Conclusion

Designing a research problem statement depends on interests that require answers, with which research objectives are presents. By involving interests, problem statements can be directed according to the level of research to be made, the methodology involved, including research systematic and problem statement generated based on the targets and objectives with the literature review and methodology.

Acknowledgement

This paper is presented to TALENTA researchers, thanks to the support provided by the Research Institute (*Lembaga Penelitian*) and Community Service Institute (*Lembaga Pengabdian pada Masyarakat*) of Universitas Sumatera Utara.

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