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Sustainability Awareness in Industrial Organizations

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Abstract

The main goal of this paper is to explore new an approach to measure the degree or percentage of sustainability awareness in industrial organizations. This evaluation was conducted through in-depth interviews with main stakeholders and the assessment approach was developed in theoretical concept and its applicability was directly tested in one small and medium-sized industrial organization. The designed questionnaire will be distributed among stakeholders and the collected data will be analyzed and discussed individual and aggregated. A real life case study will be used to illustrate the proposed approach of estimating the degree of awareness, and the new assessment approach can be used as a template to assess the current state of awareness in industrial organizations. The results show that the awareness of sustainability is different from one stakeholder to another.

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1. Introduction

The value of sustainability awareness can be measured by realization of utilizing knowledge and facts. This value consists of a variety of ways to identify how, why, and to what degree stakeholders understanding the concept of sustainability and its dimensions [1]. While industrialists (e.g., practitioners) understand the term of sustainability very well, this term itself proved to be difficult when used in society. This often enhances the confusion around “sustainability”. Therefore, there is a big gap of awareness between public and industry and the application of sustainable development needs participation of everyone in the community. It is not possible without the participation of not only popular and effective people are aware of how their daily activities and tasks but also meaning of sustainability and how apply it.

As industrial organizations grow very rapidly day by day due to economic growth and employees’ well-being, the natural resources deplete causing environmental effects (e.g., emissions and pollution). Therefore, governments have stipulated a variety of laws and regulations to protect the environment, and industrial organizations must create

environmental management systems to monitor their daily production/manufacturing operations [1]. Since the last 20 years, the concept of sustainability/sustainable development was appeared and popularized around the world and some regulations request from industrial organizations to release their environmental data to employees and public. This concept achieved a very common acceptance. This acceptance shows that there is a degree of awareness with respect to sustainability [2]. The most important task undertaken by sustainability and /or sustainable development is the need to raise awareness of this concept and admit this acceptance than in public (e.g., people) and in the field (e.g., industry).

Awareness in a workplace environment (e.g., industry) is different than public. Increasing employees’ awareness of sustainability within their workplace can encourage them to implement sustainability principles and practices into their own personal activities. Although there are three dimensions of sustainability (economic, social, and environmental), the two dimensions of sustainability (economic and social) are usually used a lot in workplaces without being known from employees. Academicians in educational institutions are also responsible to provide the concepts of sustainability and

sustainable development to their students through their classes and courses within one or more chapters. Although sustainable engineering was recommended to be studied as a new educational course in Engineering Schools [3], it is preferable to add one or more chapters in each course talking about or explaining the sustainability concept in his/her course (author perspective).

The remaining part of this paper is organized into several sections as follows. Section 2 conducts a brief literature review related to awareness of sustainability. Section three describes the proposed approach for measuring the sustainability assessment. An industry-based case study will be discussed and implemented in Section four. Section five provides a conclusion.

2. Literature Review

Although huge research works have been published in the area of sustainability, there are few studies regarding sustainability implementation and awareness. Affecting of awareness regarding green information technology was studied and presented with respect to environmental sustainability [1]. Sustainable engineering was recommended to be studied as a new educational course in Engineering Schools [3]. Accenture [4] investigated through hundreds of companies around the World to see the importance of sustainability. This study showed that almost 93% of these companies though their chief executive officer (CEO) considered sustainability as the most important issues to be successes and/or survived. Studies of sustainability programs from some companies show that good environmental practices will increase their profit [5]. Innovation for increasing competitiveness, lowering costs and increasing revenues in some companies was analyzed [6]. The value of sustainability was recognized through studies of business strategy of some companies related to innovation [7]. Motivators and barriers to adapt sustainability concept to overcome current issues faced by manufacturing industry were investigated [8].

Glavic and Lukman [9] presented sustainability terms, definitions and interconnections for understanding and better communication in the process toward sustainable development. Sustainability information in the print press journals, periodicals and textbooks to provide the development of sustainability science was analyzed [10]. A fully detailed discussion about sustainable manufacturing showing the importance of sustainable manufacturing as one of the most important issues regarding sustainable development was presented [11]. Challenges, perspectives and recent advances in support of sustainable production operations decision-making through sustainable design, sustainable manufacture and sustainable supply chain management were reviewed [12]. Requirements of manufacturing systems in a wide scope with clarifying their limitations and bottlenecks were discussed [13]. Importance of integrating sustainability with manufacturing and along different objectives (function, competitiveness, profitability and productivity) was investigated [14]. Key requirements for engineering sustainability including sustainable resources, sustainable

processes, increased efficiency and reduced environment impact were identified [15]. A brief explanation and an analysis of sixteen of the most widely initiatives to embed sustainability into companies' systems were provided [16].

3. Proposed approach

Measuring the level of sustainability awareness regarding industrial organizations is based on the stakeholder types. These types are: academic, government, public, and industry. Each type has its own infrastructure and the total industrial organization awareness is aggregated based on these individual types. Estimating the degrees of sustainability awareness in industrial organizations are still ambiguous and an ill-structured problem because they are subjectively described assessments and are unsuitable and ineffective classical techniques [17]. The analysis could be performed in an interview survey by quantifying the importance from 1 to 10 based on three concepts of evaluation: optimistic; most likely and pessimistic. This analysis is also proposed from a system analyst's perspective, which means it has some delimitation by distributing a questionnaire among experts in public (regular people), government, industry, and professors (academic). These questions might not be enough but they give an idea of how the industrial organization is struggling today and an indication of influences in the future.

3.1 Fuzzy logic approach

The basic architecture of each awareness type (academic, government, public, and industry) is depicted in Figure 1. In order to perform the awareness type evaluation, the system architecture consists of three main parts: fuzzification interface, fuzzy measure, and defuzzification interface.

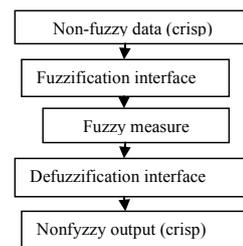


Figure 1: Architecture for fuzzy logic Approach

The proposed technique will be adapted to combine all dimensions and their corresponding infrastructures to determine the overall performance for academic, government, public, and industry. All these issues will be explained in the following steps:

Step 1: Questionnaires are designed for each issue including all essential elements regarding public, government; industry and academic (see section 3.2).

Step 2: Questionnaires are distributed to specific experts.

Step 3: Questionnaires containing raw values are gathered separately.

Step 4: Raw data are aggregated.

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