Trialogical Model in Data Analysis Using Spreadsheet
Trialogikal Model dalam Analisis Data Menggunakan Hamparan Elektronik

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Abstract

The advance of information technology and the availability of data in education management provide an opportunity, to run data analysis to assist top management in decision making. Information technology can transform data analysis in a more concise format, accurate, and in a short time, by using any available office application software which is already installed on the computer. However, even though the management at an operational-level in an organization usually already has the software installed on a computer to support the managing of data, the extent of knowledge and skills to use the software efficiently in decision making is still limited. This study applies the Trialogical Model to implement decision support tools for data analysis of distribution lecturer's teaching and learning (TnL) hour at IPG Kampus Pendidikan Teknik (IPGKPT) by grade specifications. A literature review using the interpretive paradigm involved the Trialogical Model (includes Monological and Dialogical), which is a knowledge-based model was carried out to run the data analysis using a Microsoft (Ms) Excel spreadsheet with Visual Basic for Application (VBA) and graphical interface. The findings show the usability of the Trialogical Model in the development of the decision support tool for TnL data analysis.

Keywords: data analysis, Trialogical Model, Microsoft Excel spreadsheet.

Abstrak

Kemajuan teknologi maklumat dan ketersediaan data dalam pengurusan pendidikan memberikan peluang, analisis data dilakukan untuk membantu pihak pengurusan membuat keputusan. Teknologi maklumat dapat mengubah analisis data dalam format yang lebih ringkas, tepat, dan dapat diakses dalam waktu yang singkat, dengan menggunakan perisian aplikasi pejabat yang sedia dipasang pada komputer. Namun, walaupun pihak pengurusan pada pelbagai peringkat operasi dalam organisasi mempunyai perisian yang tersedia dipasang pada komputer masing-masing, namun sejauh mana pengetahuan dan kemahiran menggunakan perisian dengan cekap dalam mengurus membuat keputusan masih terbatas. Kajian ini menggunakan Model Trialogikal untuk melaksana alat sokongan keputusan analisis data berkaitan agihan jam pengajaran dan pembelajaran (PdP) pensyarah di IPG Kampus Pendidikan Teknik (IPGKPT) mengikut spesifikasi gred. Tinjauan literatur menggunakan paradigma interpretatif melibatkan Model Trialogikal (termasuk Monologikal dan Dialogikal), yang merupakan model berdasarkan pengetahuan dilakukan untuk melaksana analisis data tersebut menggunakan perisian hamparan elektronik Microsoft (Ms) Excel dengan Visual Basic for

Application (VBA) beserta antara muka grafik. Hasil kajian menunjukkan kebolehgunaan Model Trialogikal untuk menjana alat sokongan keputusan analisis data agihan PdP.

Kata Kunci: analisis data, Model Trialogikal, hamparan elektronik Microsoft Excel.

INTRODUCTION

The organization management is ever-changing, and there is an increasing need to respond quickly to decision making and to innovate in the operation. Making such decisions may require a considerable amount of relevant data, information, and knowledge, which sometimes decisions must be made quickly, frequently in real-time, and usually need the computerized support (Turban et al., 2007). The value of data that was transformed into meaningful information can help decision-makers achieve the organization's goals and improve the success of the administration.

In education management, the availability of data provides an opportunity for analyzing the data and using the reports from it to assist the top management in decision making. Data can be manipulated using the office application software, regardless of the type and software use, and complete the data analysis in a more concise format, accurate and in a short time. To plan the development of decision support tools required the guidance, knowledge, skills, and a clear understanding of the information needed by top management at the operational, tactical, and strategic levels of management. A tool may be either a model-based or a knowledge-based system that can support the decision making in semi-structured or unstructured decision situations. The tool does not mean to replace a decision-maker, but to extend the top management in decision-making capabilities. The characteristics of a tool that combined with the human judgment and computerized information system, with a user-friendly design and using a model for analyzing the decision situations, help to improve the effectiveness of decision making and support the education organization managerial.

Referring to Seref & Ahuja (2008), the decision support tool can be developed using a spreadsheet and model it with Visual Basic for Application (VBA) through a graphical user interface. However, even though this software is usually available on the computer, the extent of knowledge and skills to develop or run the data analysis by using the software efficiently in decision making is still limited.

Since the initiatives to develop the tool is essential in any organization, including in the education management domain, it has to start from at the educational operational level. The solution in the education management system is teachers training college, which one of the operational work needs to have the mechanism is the management of the distribution lecturers teaching and learning (TnL) hour by grade specifications. Based on the guidelines of 'Amanah Tugasan Pensyarah (ATP)' by the Institut Pendidikan Guru Malaysia (IPGM) in 2019, every academic lecturer must have 'Amanah Tugasan Syarahan (ATS)' and 'Kesetaraan Jam Syarahan (KJS)' in the scope of duties. ATS is the lecturer in TnL contexts, including preparation of TnL, whereas KJS is a component related to academic scholar duties and services. The issues identified by the campus timetable committee are:

- the distribution hour of data analysis TnL which prepared manually, easily having an error in calculation and resulting dubious accuracy,
- the data analysis (report) takes a long time to prepare, and
- the finding in the data analysis is not understandable to interpret by other officers.

According to Stefanova (2015), the application of Trialogical Model of knowledge management can generate new knowledge ideas. The use of a model can structure the experience of acquiring knowledge, not only based on the individual or the group interaction, but involves further action of creating new knowledge, processes, or objects (trialogical). Therefore, this study applies the Trialogical Model, which is a knowledge-based model (Kusmin, 2019) to do a further action to develop the decision support tool for automating the data analysis of distribution lecturer's TnL hour using Microsoft Excel spreadsheets with VBA.

BACKGROUND

Data Analysis

At various levels of organization management, data analysis is required for decision making, which the efforts have to start from identifying the issues and must have problem-solving skills; therefore, it will result in the meaningful data analysis output. Referring to Stair & Reynolds (2010) based on Herbert Simon, the decision strategy has three main phases, the 'Intelligent phase' - identifying and determining issues and opportunities, including resource constraints and the environmental issues; 'Design phase' - designing alternative solutions and assessing each possibility; and 'Choice phase' - choose the appropriate action. In this study, the data analysis tool developed to support the decision making of distribution lecturer's TnL hour by determining issues, constraints, and design solutions to choosing the appropriate solution.

Trialogical Model

The model is relying the perspective of learning is not only based on the individual knowledge acquisition (monological) or social interaction (dialogical), but activity is organized around to transforming to the further action, or creating shared knowledge objects or ideas and practices (trialogical) (Paavola & Hakkarainen, 2009; Stefanova & Gercheva, 2014; Sansone, Cesareni & Ligorio, 2016; Tammeorg, Mykkanen, Rantamaki, Lakkala & Muukkonen, 2019). Trialogical Model is an approach that focuses on how a group of people creates and modifies the conceptual artifacts (whether text, project design, model, concept sketch, etc.), which doesn't focus only on the understanding of knowledge. It converges the developing innovations in works with the environment supported or to implement using technology-mediated collaborative work with knowledge artifacts and practices (Karlgren, Paavola & Ligorio, 2020; Donato, Garofalo, Malandrino, Pellegrino, Petta & Scarano, 2019).

The features of this model are:
- support the process of creating new ideas for future change.
- help overcome barriers of the learning approach used to develop new practices together.
- support the ideas driven by investigative purposes.
- support analytic work to perform repetitive tasks.
- encourage the use of current practices.
- make changes to existing practices.

In this study, the Trialogical Model applied to converge the decision support tools for creating new idea practices of the development of data analysis of distribution lecturers' TnL hour.

Microsoft Excel and VBA Worksheets

A Microsoft Excel spreadsheet is one of the applications software that can be used to develop the decision support tool as it's available almost on computer systems which have easy-to-learn features and suitable for data analysis solution (Seref & Ahuja, 2008). The spreadsheet worksheet is ideal for building prototypes of small-scale decision support systems or building a prototype before the actual operation is developed. Using it, the user interface can be created by placing an optional 'button' that has a macro function or generates a VBA (Rozalia & Valentino, 2008). Through VBA, which is a command in programming languages, further manipulation of workflows can be made even more dynamic. VBA is a programming directive to automate operations in Microsoft applications such as in Microsoft Excel spreadsheet. VBA allows users to control the workflows to execute the complex commands which were previously done manually. With VBA, instructions that take a longer time to prepare can be done more quickly and reduce the risk of human error, especially in performing repetitive tasks (Urtis, 2011),

In this study, the ideas and the development of the data analysis for decision-making tools using spreadsheets with integrating VBA for automation of the data analysis.

METHODOLOGY

This study involves a literature review (qualitative) based on the interpretive paradigm and observation by the members of the timetable committee, included:
- issues and gaps from literature and observation (refer to the introduction and background of the study); and
- interpreting the finding to the development of a decision support tool for automating the data analysis (refer to the findings of the study).

FINDINGS

Based on the literature review and the observation findings, the knowledge analogy (monological) explores knowledge as an individual mind's property or characteristic. An individual is a basic unit of

knowing, and learning is an agent process. In this study, the metaphor is based on the issues and the comments highlight of the campus meeting, referring to the manual analysis of the distribution of lecturers TnL hour done before, which leads to an examination of a new approach of knowledge structures of data analysis within among the members of the time table committee.

Participation practices (dialogical) examines the growing up process to innovate the solution to function according to its norms. The participatory perspective, occurs a shift of all members from peripheral to full participation. The committee assimilates or constructs the development of ideas, include creative elements, and make the meaning of data connections to decision making. Knowledge is not in the world itself or within the mind of an individual; it is an aspect of making a solution and taking innovative elements into account which focus the participation view on the outcomes.

The third knowledge creation (trialogical) is to overcome the acquisition and participation approaches to the development of innovative inquiry through new ideas, tools, and practices to support intelligence action to enrich the products or outcomes. The elicit practices promote innovation, knowledge of the solution, which the aim is progressively relying on data analysis using Microsoft Excel spreadsheet with a VBA platform for automating data analysis as the decision support tools.
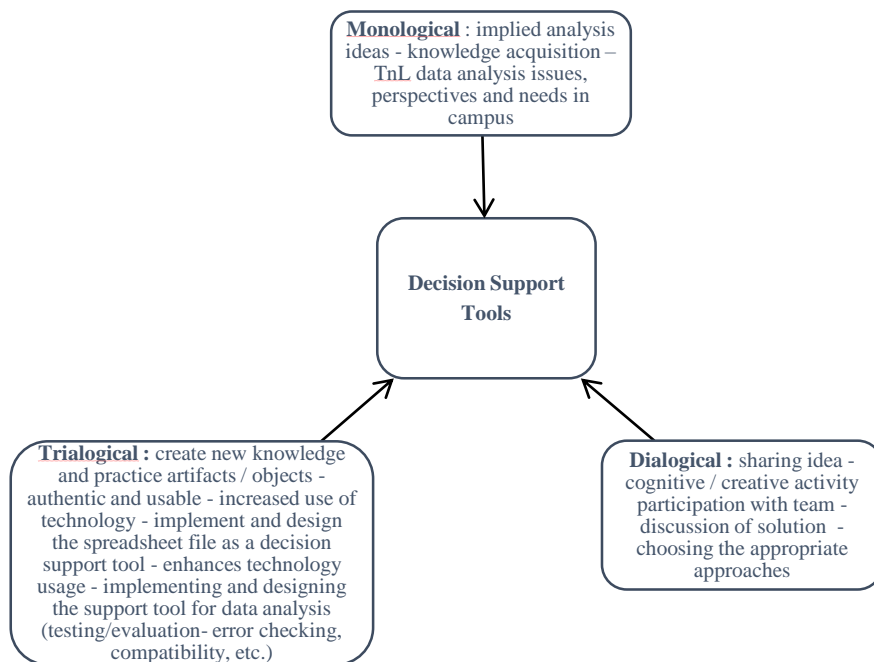

Figure 1: Adaptation of Trialogical Model in the Implementation of Data Analysis.

The acquisition view may be seen to present a 'monological' view of human cognition in focusing within-mind process. The participation view appears to represent a 'dialogical' view that emphasizes the interaction with the environment, or among people. The knowledge creation represents a 'trialogical' approach that focuses on the collaborative development of mediating objects of decision support tools and the viewpoint of the adaptation model in data analysis in this study, as shown in Figure 1, and the perspective applies to the implementation of data analysis tools performed in Figure 2. It starts with addressing the situation and knowledge acquisition involving monological, dialogical, and trialogical.
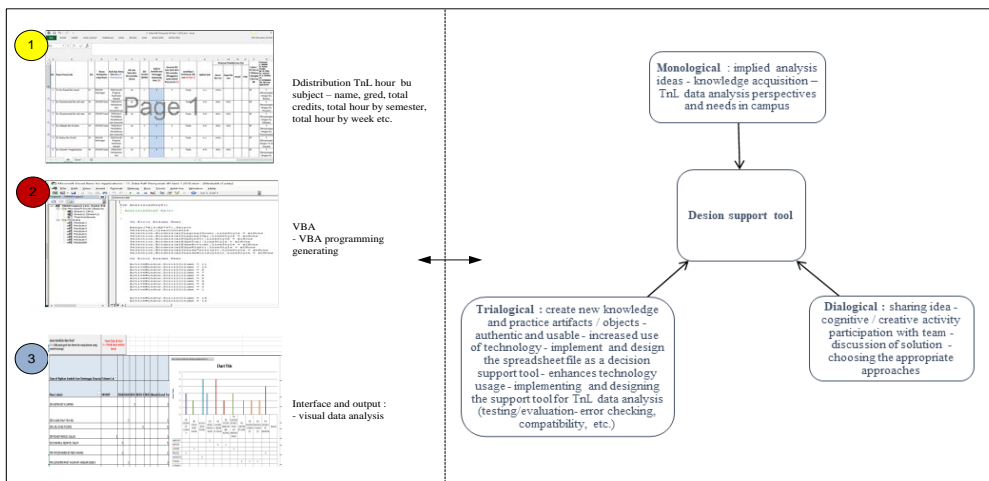

Figure 2: Implementation of Data Analysis Tool.

CONCLUSION

Data is an essential asset to the organization; the more it can be shared is better. Although this study discusses the small scope of the development of a decision-making support tool, the application has improved the quality of data reporting in the college. However, the combination of M Excel with VBA in the small-scale data support needs the committee has the knowledge and skills to manage ideas; therefore, the development tools meet the management needs. The use of spreadsheets can be applied at other levels of operational works without requiring users to learn specific programming instructions. Overall, this study hope can be used as a reference to the usability of the Trialogical Model to innovate in the implementation of the small decision-making solution.

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