A Microsoft Excel Spreadsheet for Selecting Organisational Improvement Initiatives based on Malaysia Business Excellence Framework and Industrial Revolution 4.0

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Abstract: One type of the decision support tools that can be used to select appropriate organisational improvement initiatives is by using a Microsoft Excel spreadsheet. Organisational improvement initiatives involve approaches, technologies, management systems, techniques and/or tools, such as Lean, Cloud Computing, Quality Management System and Benchmarking. The objectives of this project are: (1) to identify the main organisational improvement initiatives based on Malaysia Business Excellence Framework (MBEF) and Industrial Revolution (IR) 4.0; (2) to investigate the existing Microsoft Excel Spreadsheets for the selection of organisational improvement initiatives; and (3) to develop a new version of a Microsoft Excel spreadsheet for selecting improvement initiatives. Data was collected using online questionnaire survey based on purposive sampling. The respondents of the survey involved consultants, managers and lecturers who are experts in the area related to operations and quality. The new version of Microsoft Excel spreadsheet consists of main interface, areas for improvement based on six enabler criteria of 2020-2025 MBEF (Leadership, Strategy, Information, Customer, Workforce and Process), examples of problems in the organisations, examples of improvement initiatives according to the MBEF, brief description of 73 organisational improvement initiatives (including IR 4.0 technologies), decision criteria, and summary report of the selection results. Based on the feedback from the survey, most of respondents agreed that the listed improvement initiatives are relevant, the spreadsheet is easy to use, the steps to complete the decision matrix are easy to follow, the selection criteria are suitable, the decision result are easy to understand and the Microsoft Excel spreadsheet can assist organisations in selecting appropriate improvement initiative.

Keywords: Industrial Revolution 4.0, Malaysia Business Excellence Framework, Microsoft Excel Spreadsheet, Organisational Improvement Initiatives

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1. Introduction

With numerous improvement initiatives currently available in the market (such as Lean, Six Sigma, ISO9001, and Business Continuity Management), organizations have encountered difficulties in choosing appropriate improvement initiatives. Organizations need to choose the right initiative that suits the organizational situation [1]. Unfortunately, little research has been found on the selection of improvement initiatives using Microsoft excel spreadsheets. Existing Microsoft Excel spreadsheets [2,3] use previous version of Malaysia Business Excellence Framework (MBEF) and does not include Industrial Revolution (IR) 4.0 technologies. To address this issue, the existing Microsoft excel spreadsheets were updated and improved based on the 2020-2025 MBEF [4] and IR 4.0 [5].

The objectives of this project are: (1) to identify the main organisational improvement initiatives based on MBEF and IR 4.0; (2) to investigate the existing Microsoft Excel Spreadsheets for the selection of organisational improvement initiatives; and (3) to develop a new version of a Microsoft Excel spreadsheet for selecting improvement initiatives based on MBEF and IR 4.0.This project focuses on improving the existing Microsoft Excel Spreadsheets for the selection of organisational improvement initiatives [2,3] by aligning with 2020 - 2025 MBEF and IR 4.0. In this study, Simple Additive Weighting (SAW) method is used when choosing an improvement initiative.

2. Literature Review

Organisational improvement initiatives involve approaches, technologies, management systems, techniques and/or tools, such as Lean, Cloud Computing, Quality Management System and Benchmarking. These improvement initiatives can be arranged according to the areas for improvement which can be based on enabler criteria of Business Excellence Framework. Business Excellence Framework can be considered as a Total Quality Management (TQM) framework. Business Excellence Framework can be described as a non-prescriptive organisational framework based on several main criteria that can be categorised as 'enabler' and 'result' [6]. Therefore, Business Excellence Framework can be used as an overarching approach for managing and aligning various organizational improvement initiatives [7].

Decision support tools are used in many organisations to support organisational decision making activities. One type of the decision support tools that can be used to select appropriate organisational improvement initiatives is by using a Microsoft Excel spreadsheet. Mohammad [1], Vattiyan [2], and Mohammad & Yahya [3] had developed decision support tools for selecting organisational improvement initiatives using Microsoft Excel spreadsheet. Areas for improvement in Mohammad [1] was based on enabler criteria of 2011-2012 Baldrige Criteria for Performance Excellence and the EFQM Excellence Model. Vattiyan [2] and Mohammad & Yahya [3] used enabler criteria of previous version of MBEF. No prior studies were found using 2020-2025 MBEF and included IR 4.0 technologies in the decision support tools. 2020-2025 MBEF consists of seven main criteria, whereby six enabler criteria are: (1) Leadership, (2) Strategy, (3) Information, (4) Customers, (5) Workforce, and (6) Process [4]. Examples of Industrial Revolution 4.0 technologies include additive manufacturing, Artificial Intelligence, Big Data Analytics, Cybersecurity, simulation, cloud computing, augmented reality, Internet of Things (IoT) and autonomous robots [5].

3. Research Methodology

Figure 1 shows the overall procedures of this research. It starts with identifying main organisational improvement initiatives based on Malaysia Business Excellence Framework and Industrial Revolution 4.0. Initial version of Microsoft Excel spreadsheet was developed based on existing Microsoft Excel spreadsheets for the selecting organisational improvement initiatives [2,3]. Final version of the spreadsheet was created based on feedback from expert survey.
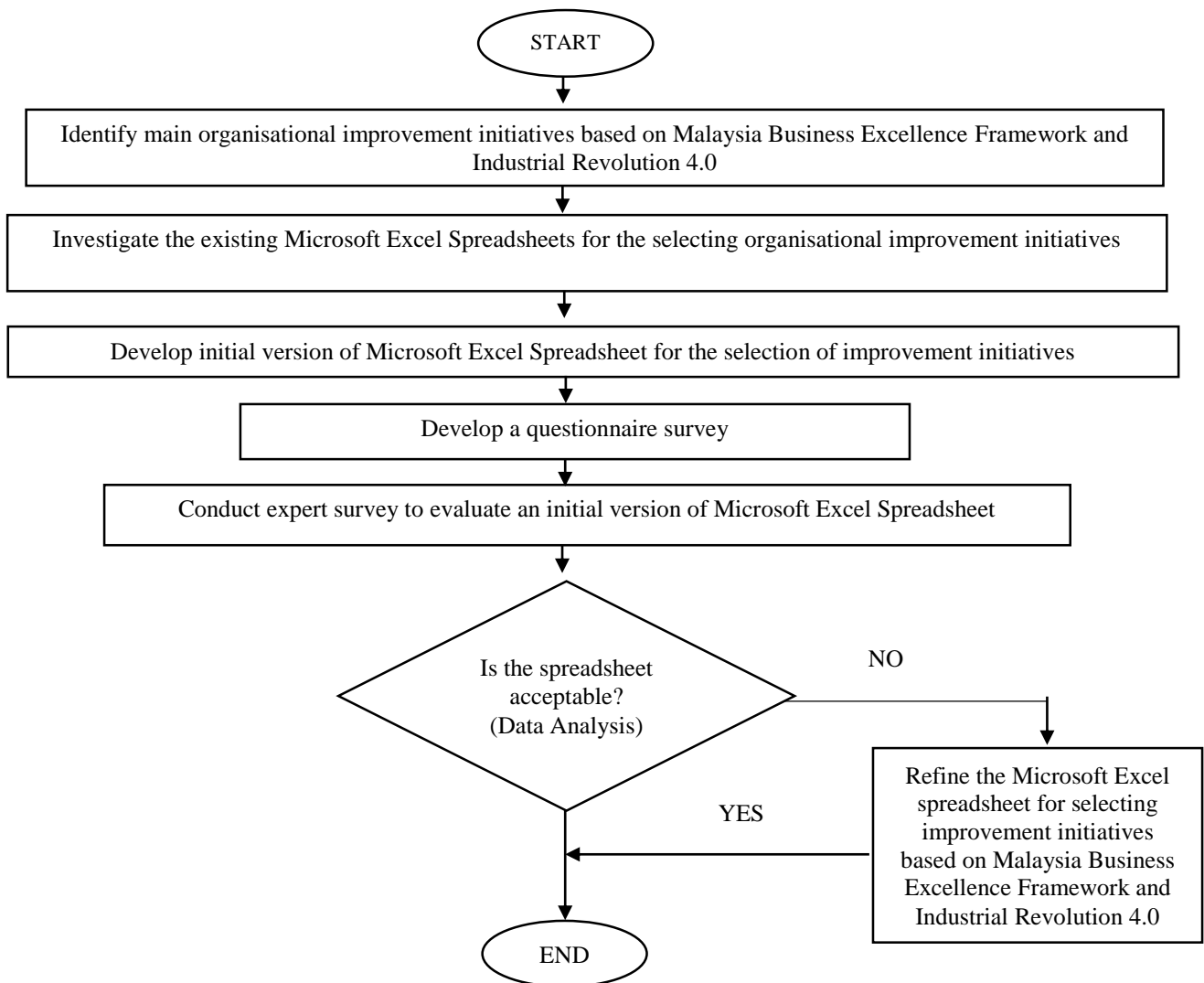
Figure 1: Flow chart of the research procedures

The expert survey was conducted through self-administered questionnaire. The questionnaire was adopted from Mohammad [1] and Vattiyan [2] questionnaires. The questionnaire consists of three main sections: (1) Background of the respondent, (2) Evaluation of the Microsoft Excel Spreadsheet for selecting organisational improvement initiatives, and (3) Comments and suggestion. Based on purposive sampling, the questionnaire was distributed to eight experts. The experts were chosen based on their background and work experience related to the quality management and organisational improvement. All the respondents were contacted through email and WhatsApp. Seven respondents have completed the survey. Respondents involved two consultants, two managers and three lecturers who are experts and have more than four years of experience related to quality and organisational improvement.

4. Results and Discussion

In Section 2 and 3 of the questionnaire, the respondents answered the questions according to the degree of agreement of the statements related to the initial version of Microsoft Excel spreadsheet. There are five levels of agreements related to statements/questions as shown in Table 1. Results in Table 1 indicates that most of the respondents agreed that the listed improvement initiatives are relevant, the proposed Microsoft excel spreadsheet is easy to use, the steps to complete the decision matrix are easy

to follow, the criteria are suitable to be used for selecting improvement initiatives, the decision results are easy to understand, and the Microsoft excel spreadsheet can help organisation to select appropriate improvement initiatives. Table 2 summarises feedback from section 3 of the questionnaire which covers the strengths and weaknesses of the initial Microsoft Excel spreadsheet.

Table 1: Respondent's degree of agreement to the statements/questions related to the Initial Version of Microsoft Excel spreadsheet
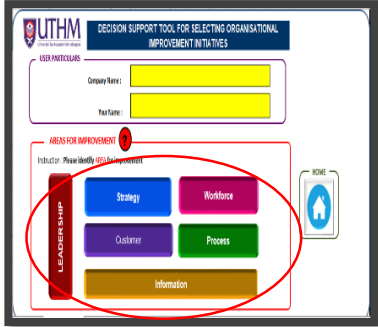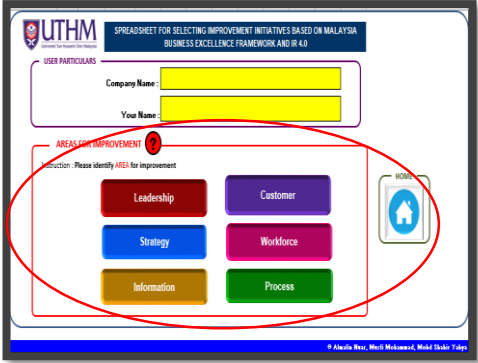
Statements / Questions	Degree of agreement				
	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
1. The listed improvement initiatives are relevant.	1	5	1	-	-
2. The proposed Microsoft excel spreadsheet is easy to use.	-	5	2	-	-
3. The steps to complete the decision matrix are easy to follow.	1	4	2	-	-
4. The criteria are suitable to be used for selecting improvement initiatives.	1	4	2	-	-
5. The decision results are easy to understand.	6	1	-	-	-
6. The Microsoft excel spreadsheet can help organisation to select appropriate improvement initiatives.	1	5	1	-	-

Table 2: Feedback on the strengths and weaknesses of initial Microsoft Excel spreadsheet for selecting organisational improvement initiatives

Respondents	Strengths	Weaknesses
R1	• Easy to use, interactive, and complete criteria	• No help menu for assisting the process
R2	• Assist decision maker to adopt the cookbook approaches	• May required expert to assist and maybe difficult for SME
R3	• Identification of typical organizational improvement initiatives such as Lean and Six sigma	• Connection between the spreadsheet to the IR4.0. Majority of manufacturing companies in Malaysia are at IR2.5 (still labour oriented)
R4	• Comprehensive and complete	• Less user friendly
R5	• The guidance is step by step for determining improvement initiative	• The evaluation is not well explained in proper manner including how to determine the weight and the final conclusion.
R6	• Microsoft excel spread sheet helps companies to select improvement initiative • Microsoft excel spreadsheet helps employees understand improvement initiatives	• Improvement initiatives are not clearly set based on existing problems in the company
R7	• Easy to use and provide guide for a final solution.	-

Refinement made to the final version of Microsoft Excel spreadsheet as compared to initial version are shown in Table 3. The final version of Microsoft excel spreadsheet starts with a main interface (see Table 3). The user should fill up the name of person in charge and company name. At the main interface, user can click area for improvement. Areas for improvement are based on six enabler criteria of 2020-2025 MBEF (Leadership, Strategy, Information, Customer, Workforce and Process). Users also can get information related to the brief description of MBEF enabler criteria and examples of problems / issues in the organisations based on MBEF enabler criteria.

Table 3: Comparison of initial version of Microsoft Excel spreadsheet and final version of Microsoft Excel spreadsheet

Items	Initial Excel Spreadsheet	Final Excel Spreadsheet
Main interface		The new interface more organised
Examples of problems in organisations	No examples of problems in organisation	Provide examples of problems/issues in organisations according to the enabler criteria of Malaysia Business Excellence Framework
Examples of improvement initiatives for Process	Automated Guided Vehicle (AGV) and Smart Warehouse are not included.	AGV and Smart Warehouse were added in Process category (see Figure 2)
Decision criteria for selecting improvement initiatives	No criteria related to readiness to implement IR4.0 technologies	Include decision criteria related to readiness to implement IR4.0 technologies (see Figure 3)

After choosing the area for improvement, user have to shortlist two or three improvement initiatives. Examples of the organisational improvement initiatives are provided as guidance for the user. Figure 2 shows the examples of improvement initiatives for Process. In total, 73 organisational improvement initiatives (including IR4.0 technologies) are listed in the spreadsheet covering six enabling criteria of MBEF (Leadership, Strategy, Information, Customer, Workforce and Process).
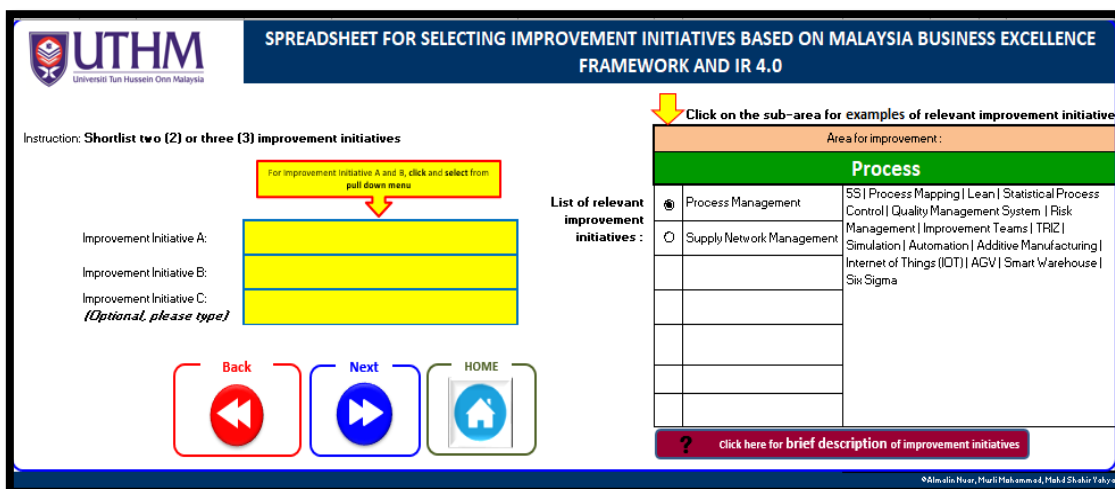

Figure 2: List of improvement initiatives for Process

Next step is decision criteria. In this step, user need to select two or three most important criteria for selecting improvement initiatives (see Figure 3). Then, the user selects the level of importance for each decision criteria and complete the score for each improvement initiatives that reflect the decision criteria. Finally, summary report is shown. Summary report consists of decision ranking, weighted score for each criteria and total score for the selection of improvement initiatives.

Figure 3: Selection of criteria for selecting improvement initiatives

5. Conclusion

Overall, the objectives of this study have been achieved. The first objective for this study is to identify the main organisational improvement initiatives based on MBEF and IR 4.0. In total, 73 main improvement initiatives were identified from literature review and survey. Based on survey, most of respondents are agreeing for the listed improvement initiatives are relevant to use.

The second objective is to investigate the existing Microsoft Excel spreadsheets for selecting improvement initiatives. Two spreadsheets [2,3] were identified as most relevant to be improved. These two spreadsheets used previous version of MBEF and do not include IR 4.0 technologies.

The final objective is to develop a new version of Microsoft Excel spreadsheet. The Microsoft Excel spreadsheet consists of main interface, areas for improvement based on six enabler criteria of 2020-2025 MBEF (Leadership, Strategy, Information, Customer, Workforce and Process), examples of problems / issues in the organisations based on enabler criteria of MBEF, examples of improvement initiatives according to the MBEF, brief description of 73 organisational improvement initiatives (including IR4.0 technologies), decision criteria, weighting importance of decision criteria and summary report of the results. This Microsoft Excel spreadsheet can assist organisations in selecting appropriate improvement initiatives based on their context.

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