ADOPTION OF LEAN [illegible] ELAYS IN MALAYSIAN CONSTRUCTION PROJECTS

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ABSTRAK

Industri pembinaan merupakan sektor yang sangat penting bagi setiap ekonomi negara di seluruh dunia. Walaubagaimanapun, tahap kelewatan ini telah disahkan wujud dalam industri pembinaan di seluruh dunia dan ini juga menjadikan keadaan di Malaysia semakin berleluasa. Di Malaysia, kelewatan ini telah dilaporkan melalui projek-projek yang telah melebihi tempoh yang ditetapkan selama beberapa hari; ada antaranya bertahun-tahun dan ada juga yang ditangguhkan selama-lamanya (terbengkalai). Disamping pelbagai model, kaedah dan pendekatan yang telah diperkenalkan untuk meminimumkan kelewatan, penggunaan Lean Thinking dan peralatan dalam projek-projek pembinaan telah memainkan peranan penting, demikian juga, Lean Construction. Namun, idea yang mendasari konsep lean, keutamaan yang mencukupi dan pilihan yang peralatan lean sesuai adalah penting dalam menentukan kejayaan atau kegagalan pelaksanaannya. Objektif kajian ini adalah untuk mengkaji punca-punca kelewatan dalam projek-projek pembinaan di Malaysia dan membangunkan rangka kerja kawalan peralatan lean-tertunda berdasarkan kesan penggunaan peralatan lean. Berdasarkan kajian literatur, dua rangka kerja konsep utama telah dibangunkan dan masing-masing adalah 4P dan PESTLE Framework Analysis bagi sumber kelewatan Luaran dan Dalaman yang telah dikenalpasti. Sebagai ganti, dua model utama penyelidikan telah dibangunkan. Sementara itu, empat puluh alat lean telah dipilih dan dikelaskan pada setiap model. Model-model kajian telah ditetapkan sebagai model berasaskan keputusan hasil daripada proses hierarki analisis (AHP), yang kemudian diuji melalui temu bual dalam konteks projek Malaysia. Hasil dapatan model penyelidikan mengesahkan Last Planner System (LPS), Concurrent Engineering dan Daily Huddle Meeting sebagai alat kawalan lean-tertunda yang paling berkesan untuk Model I (4Ps). Sementara itu, alat lean yang paling kurang berpengaruh adalah Preventive Maintenance, SMART Goals dan Multi-Process Handling. Walaupun begitu, Model II (PESTLE) mendapati Concurrent Engineering, Last Planner System (LPS) dan Daily Huddle Meetings sebagai mempunyai pengaruh yang kuat. Walau bagaimanapun, Total Productive Maintenance (TPM), Preventive Maintenance dan SMART Goals dikenalpasti sebagai alat lean yang paling kurang sesuai untuk Model II. Model-model kajian menunjukkan keseragaman dalaman, ketelitian, dan keputusan yang mantap. Secara keseluruhannya, tesis ini mempunyai implikasi teori, metodologi dan praktikal yang jelas. Amnya, hasil kajian ini akan dapat membantu dari segi teori dan praktikal terhadap kawalan kelewatan kerana ia menyediakan satu langkah yang penting dan penyelesaian yang praktikal melalui alat penerimaan lean untuk mengawal kelewatan, terutamanya di Malaysia.

ABSTRACT

The construction industry is a very significant sector in every economy worldwide. However, it is confirmed that high levels of delays exist in the construction industry around the world and this makes the situation in Malaysia more pervasive. In Malaysia, delays have been reported on several projects with some exceeding schedule for many days; some many years(s) and some delayed forever (total abandonment). While a variety of relevant models, methods, and approaches for minimizing delays have been contended, the application of lean thinking and tools in construction projects has been instrumental, thus, lean construction. Nonetheless, on the underlying idea of the lean concept, adequate prioritization and appropriate choice of lean tools is crucial for success or failure of its implementation. The objective of this research was to investigate delay sources in Malaysian construction projects and develop lean tool-delay control framework based on the impact of lean tools adoption. Based on the literature review, two main conceptual frameworks were developed and these are 4Ps and PESTLE Framework Analysis for the identified Internal and External delay sources respectively. In lieu of this, two main research models were developed. Meanwhile, forty lean tools were selected and ranked on each of the models. The research models were specified as an analytic hierarchy process (AHP) decision-based models, which was then tested through an interview in the Malaysian project context. The findings of the research model confirmed Last Planner System (LPS), Concurrent Engineering and Daily Huddle Meetings as the most effective lean-delay control tools for Model I (4Ps). Meanwhile, the least influenced lean tools were found to be Preventive Maintenance, SMART Goals, and Multi-Process Handling. Even so, Model II (PESTLE) found Concurrent Engineering, Last Planner System (LPS) and Daily Huddle Meetings as having a strong influence. However, Total Productive Maintenance (TPM), Preventive Maintenance and SMART Goals were found to be the least suitable lean tools for Model II. The research models showed internal consistency, rigor, and robust findings. Overall, the thesis has significant theoretical, methodological and practical implications. In general, the findings of this study would be feasible for knowledge and practice on delay control as it provides an important step and practical solutions through the adoption of the lean tool to control delays, especially in Malaysia.

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LIST OF ABBREVIATION

4Ps	Project Scope, Project Management, Project Participants and Procurement
PESTLE	Political, Economic, Social, Technological, Legal and Environmental
LC	Lean Construction
MCDM	Multi-Criteria Decision Making
AHP	Analytic Hierarchy Process
CIDB	Construction Industrial Development Board
CIMP	Construction Industry Master Plan

CHAPTER 1

INTRODUCTION

1.1 Introduction

The construction industry is the life breath of any organization and plays a very significant role in the economies worldwide. The considerable impact of this industry on the overall health of the economy makes it an interesting and crucial area for researchers, economists, and policy-makers, alike (Norzima, Sorooshian, & Hou, 2011; Sorooshian, 2014). Delays are mostly common in construction industries around the world (Assaf & Al-Hejji, 2006; Aziz, 2013; Faridi & El-Sayegh, 2006; Iyer & Jha, 2006; Lowsley & Linnett, 2006), and Malaysia is not an exception (Abdul Rahman, Wang, & Lim, 2012; Aftab, 2014; Alaghbari, Razali A. Kadir, Salim, & Ernawati, 2007; Mahamid, Bruland, & Dmaidi, 2012; Memon, Rahman, Abdullah, & Abde, 2014; Memon, Rahman, Abdullah, Asmi, & Azis, 2011; Sambasivan & Soon, 2007; Shehu, Endut, Akintoye, & Holt, 2014). However, the alarming rate of delays in construction projects calls for debate and a critical assessment of the real sources of delays in the industry. This puts the Malaysian construction industry in a more tenuous position. In general, studies have confirmed that very high levels of delays exist in Malaysian construction projects (Aftab, 2014; Memon et al., 2014; Shehu et al., 2014). In Malaysia, several delays have been reported on several projects with some exceeding schedule for about days, some about year(s), and some delayed forever (total abandonment) (Sambasivan & Soon, 2007; Shehu et al., 2014). This is as a result of the fact that maintaining construction projects within the planned schedule need sound strategies, careful judgment, and good practices, however, the existing or employed approaches of project management fails to deliver projects on time (Abdul Rahman et al., 2012).

Mostly, delays in construction projects development are often expensive, complicated, risky, multifaceted and extremely challenging (Sambasivan & Soon, 2007;

Patel, Jayesh, Pitroda, & Bhavsar, 2013). Meanwhile, the effects of delays on the performance of the construction industry, project parties, human lives, infrastructural developments, governments, and the overall economy make this field a critical area for investigation. Construction projects are capital intensive as it involves professionals from diverse fields, technology, machinery and considerable amount of funds and due to this any delay will incur a lot of losses in capital and investment (Abdul Rahman et al., 2012; Aftab, 2014; Mahamid et al., 2012; Memon et al., 2014, 2011; Patel et al., 2013; Shehu et al., 2014). It is, however, very much questionable as effects of these delays on all parties involved in the project often result in time and cost overruns, lawsuits and disputes, loss of investment, settlements and total abandonment (Sambasivan & Soon, 2007).

In this regards, having a thorough understanding of main sources of delays is crucial for empowering project teams to deploy practical strategies to mitigate and reduce the effects resulting from delays. The current research investigates delay sources and lean tools and their effects on controlling delays in construction projects. It has been established that the application of lean tools by project teams and industry's practitioners will minimize or eliminate wastes/delays, enhance performance and lead to great cost savings for the construction industry as well as the society (Abdul Rahman et al., 2012). The term "Lean" basically means to make work as much as easy to understand, perform and manage and the main idea underlying this concept is about reducing wastes in processes while focusing on things that add value to the customer. Thus, "Lean Management" is a continuous improvement approach used by management of the organization to systematically improve quality and efficiency in processes thereby reducing delays in an organization (Aziz & Hafez, 2013).

Generally, a construction project is expected to be completed within the agreed duration before the physical task of the project commences and projects that have performed well have been completed within the contracted period (Norzima et al., 2011; Sorooshian, Norzima, Yusof, & Rosnah, 2010). Delays in construction projects are often defined as the additional time needed before a project gets completed as compared to its original or initial time, which was agreed by the client given the project and the contractor constructing the project. As reported by Kikwasi (2013) and Sorooshian (2014), delays occur when the period of the construction project is prolonged. Likewise, according to

Majid (2006), construction projects are normally considered successful when it meets schedule, expected cost, project and client's requirements. However, recent studies have demonstrated quite a number of delays in construction projects (Mahamid et al., 2012; Memon et al., 2014, 2011; Shehu et al., 2014).

Even though several studies have been conducted on delays in construction projects, most of these studies concentrated on either sources and/or effects without effectively analyzing and grouping the sources thoroughly (Norzima et al., 2011; Sorooshian, 2014). Also, most existing studies stopped at the identification of the causal factors but did not identify practical and reliable ways of controlling the identified problems (Mahamid et al., 2012; Memon et al., 2014, 2011; Shehu et al., 2014). However, identification of the delay sources alone without identification of reliable management tools on which successful elimination of delays depend may not effectively solve the problems in construction projects (Aziz & Hafez, 2013). Interestingly, with this study, the delay sources in construction projects will be investigated, analyzed and grouped based on their common characteristics. Also, suitable lean management tools will be identified and their level of effects on controlling delays in construction projects will be established.

The primary goal for delay sources and lean tools investigation and ranking is to offer comprehensive understandings among industry practitioners and project teams to become more aware of the uncertainties and to foresee potential problems likely to confront the current and future projects and the corresponding lean tools available to adopt in their projects in which potential problems are fully anticipated. Emphatically, lean tools identification and ranking is to offer comprehensive understandings among industry practitioners on the specific lean tools for reducing delays in construction projects as past studies concentrated only on lean principles, lean application and barriers against its implementation. It has been recommended that the adoption of lean tools for construction projects minimize or eliminate delays in construction projects (Abdul Rahman et al., 2012; Aziz & Hafez, 2013; Koskela, Bølviken, & Rooke, 2013; Marhani, Jaapar, Bari, & Zawawi, 2013; Sarhan & Fox, 2013).

1.2 Problem Statement

It is noteworthy to mention that the existing body of literature has not been able to adequately address the problems associated with delays and this is the reason why failures of projects are still increasing and recurring (Aziz & Hafez, 2013; Sorooshian, 2014). This section discusses the problems this study seeks to address.

Today's construction industry faces more challenges than before and this puts Malaysian construction and the overall economy critical situation. In Malaysia, instances include; the 1998 Commonwealth Games Monorail (fully completed only in 2003); the Batu Kawa's General Forces Project; the International Airport at Kuching; and also a few other projects which showed time overruns and critical defects after their completion (Arman et al., 2009). Again, reports on government contract projects in Malaysia confirmed that about 17.3% of 417 projects were considered sick with more than 3 months delays or abandoned (Zayyana et al. 2014). A review conducted on the Bakun hydro project revealed an unsatisfactory performance following a one to three-time extension ranging from 555 days to 1403 days given to the contractor (Othman & Ismail, 2014). Furthermore, according to Othman & Ismail (2014), the Refinery and Petrochemical Integrated Development (RAPID) which is expected to start operation in 2016 would only be operative in 2017 as a result of some delay issues. Besides, a report from Hameed (2014) indicated that in Malaysia, only 20.5% of public projects and 33.35% of the private sector projects were able to be completed within time as planned in 2014. Emphatically, Memon et al. (2011) strongly argued that time overrun is one of the critical issues confronted by the Malaysian construction industry. He reiterated that in contrast to the main project stakeholders, numerous projects in Mara experience extensive time overruns and this problem is more obvious as projects mostly exceed the initial time and even cost estimates (Memon et al., 2014). One of the significant issue in Malaysian large construction projects is frequent multiple economic decelerations caused by delays (Abdullah et al., 2011). According to Hasseb et al. (2011), the effects of delays often leads to clash, claims, total abandonment of projects and slow down the Malaysian construction sector. It is therefore recommended that identification of the main delay sources should be a prime focus of the project management team (Kikasi, 2012).

Moreover, while a variety of relevant models, methods, and approaches for minimizing delays and increasing project performance have been contended, the application of lean tools and lean thinking practices in construction projects has been instrumental, robust and effective, thus, lean construction (Salimi et al. 2012; Marhani et al. 2013; Sarhan & Fox 2013; Aziz & Hafez 2013; Muhammad et al. 2013). However, the integration of the concept of lean thinking and the tools application into the project development process has its own strengths and weaknesses. For most companies, there are still some unresolved issues concerning the lean application and its effectiveness. Proper prioritization and the choice of appropriate tool is a major determinant of failure or success underlying lean application (Li 2011; Schweikhart & Dembe 2009). Thus, improvement and performance of the lean project development program cannot be achieved and this may lead to poor decision making in the lean project development implementation roadmap.

Moreover, in assessing some of these methods, approaches and models in the literature, there seems to be a gap of knowledge with respect to lean tools adoption to control delays in construction projects. This paucity relates to the fact that there has been surprisingly little academic and empirical research on the area discussed in this paper and much of what have been written about lean tools application to control construction project delays are project or country specific, concentrated on lean principles, lean application and barriers that prevent lean implementation (Sacks et al. 2010; Lajevardi et al. 2011; Marhani et al. 2013; Sarhan & Fox 2013; Muhammad et al. 2013; Nikakhtar et al. 2015) or description of a single, few lean tools; thereby neglecting other suitable lean tools, whilst others are unpublished consultancy approaches. Therefore, there is a need for more academic research that concentrates on prioritization and suitability of lean tools in the construction industry. Even though, lean tools adoption in construction projects is very key for delay control (Rahman et al. 2012; Muhammad et al. 2013; Marhani et al. 2013; Sarhan & Fox 2013; Aziz & Hafez 2013; Nikakhtar et al. 2015), but without a clear identification and prioritization, it will difficult to control delays in the industry. To deal with the suitability, applicability and effectiveness of the lean tools, this thesis develops frameworks to handle these gaps in both the internal and external environments.

1.3 Research Objectives

Generally, the aim of this research is to develop a lean application framework to control delays in construction projects. Besides, this study examines the delay sources and categorize them into grouping based on shared characteristics. Specifically, in response to the above-stated construction problems, this research intends to achieve the following objectives:

1. To develop a systematic framework to identify and categorize delay sources in construction projects.
2. To identify suitable Lean Tools to control delays in construction projects.
3. To develop a systematically ranked framework for Lean Tools to control delays in Malaysian construction projects.

1.4 Research Questions

In an effort to understand the sources of delays and suitable lean tools for controlling them, few relevant yet specific questions about delays in both the internal and external project environment and suitable lean tools need to be answered. Thus, this study will address the objectives with specific questions to interpret and elicit the variables or constructs. Specifically, the questions could be formulated as follows:

1. What are the main categories of delays in construction projects?
2. What are the lean tools that can be used to control delays in construction projects?
3. To what extent do these lean tools have an influence on delay sources in construction projects?

1.5 Research Scope

This study is limited to Malaysian construction industry. The study will focus on the most popular lean tools and rank the lean tools based on their applicability or effectiveness to control delay sources in Malaysian construction projects. Key invited experts were from construction companies with expertise and experience in projects and lean tools application. Upon researcher's consultation with Construction Industrial

Development Board (CIDB), a list of 10 construction companies was presented as the contractors in their database with knowledge and experience in lean management (refer to Appendix D for a list of contractors). These companies are classified as the highest grade of contractors based on their portfolios, experience and activities in the industry (CIMP, 2007). The key invited experts are a total of 11 companies, which are made up of the 10 contractors and 1 government institution (CIDB).

1.6 Significance of the Research

It is worth mentioning some of the significance this research seeks to contribute to the body of knowledge and practice in the area under investigation:

Firstly, this research develops a systematic framework to categorize delay sources in construction projects. In spite of the numerous studies conducted on delays in construction projects, there seems to be a lack of consensus among researchers and industrial practitioners about delay sources and its groupings (Norzima et al., 2011; Sorooshian, 2014). However, with this research all the delays have been effectively analyzed and grouped based on shared characteristics. Given this framework, would increase awareness and understanding, and provide valuable insights for researchers and stakeholders on the delay sources and its' categories. Thus, this would help project parties appreciate delay sources and devise strategies to mitigate them. Also, this framework would establish consensus among researchers on the sources of delays and their groupings.

Also, this research develops a systematically ranked framework for lean tools to control delays in Malaysian construction projects. Although it is an undeniable fact that the adoption of the lean tool in construction projects is very significant for delay control, but without a clear identification and ranking, reducing delays in the construction industry will be complicated. An interesting point here is how the lean tools can be applied, which lean tool can be used to control which delay? To deal with the suitability, applicability and effectiveness of the lean tools against the delay sources, this research develops a framework to address this issue. Emphatically, the choice of appropriate tool is a major determinant of failure or success in delay control or elimination (Schweikhart & Dembe, 2009; Li, 2011).

More also, this research improves understandings of industry practitioners through the key criteria identification. It provides project participants with information on sources if rightly understood, would reduce the likelihood of delays in construction projects. Also, the progress in the constructs and knowledge of delays contributed by the findings of this research would provide insights into policy improvement because the research results may help policy makers better understand and assess whether the lean tools in Malaysian construction industry actually improves the project performance and enhances delay control. Specifically, stakeholders may gain some insights on the areas to focus on improvements. Despite the scientific progress in the understanding of delay sources, there is a scarcity of empirical study on its identification, classification, and the specific lean tools for control in the construction sector in Malaysia. In particular, no comprehensive study has been conducted in this area. Thus, the understanding gain in the area under study would be a very significant process for project objectives achievement, in terms of time, cost, quality, safety and environmental sustainability and also minimize the percentage of the failure in Malaysian construction projects. The knowledge gained from this study would equip stakeholders and improve project delivery in order to maximize the performance of the industry and contribute to the knowledge and practice of delay control in the construction industry as a whole.

Furthermore, this research bridges the gaps existing in the current body of research in this area. Few research in this field could be found in Malaysia. Also, those studies only concentrated on identification of the delay sources without identification of reliable management tools. Even so, most of the existing body of knowledge on lean construction tools application are country or project specific, concentrated on lean application and barriers to lean implementation, lean principles or lean thinking (Sacks et al., 2010; Lajevardi et al., 2011; Marhani et al., 2013; Sarhan & Fox 2013; Muhammad et al., 2013; Nikakhtar, et al., 2015) or description of a single, two or few lean tools; thereby overlooking other suitable lean tools, whilst others are consultancy approaches which are partially and in some cases not published. Moreover, there is a noticeable absence of knowledge with respect to the main delay sources and its' categorization and lean tools adoption in Malaysian construction industry. However, this thesis enriches the existing body of literature in the spotlight of delay sources, its' categorization and lean construction tools. It explores the delay sources and ranks lean tools based on their effect on controlling delays in Malaysian construction projects for the first time in its own kind.

In summary, this research makes theoretical contributions besides other mentioned significance.

Lastly, the findings of the study will serve as a benchmark for continuous improvements of performance of the Malaysian construction industry. Apart from the academic approach, the findings from this study are hoped to assist policy makers and stakeholders to introduce effective mechanisms (lean tools) to control delays as well as to constantly improve their processes in which the likelihood of delays are anticipated.

1.7 Research Approach

This section basically outlines the procedure that was followed to complete this study. This research employed both qualitative and quantitative approaches to achieve the research objectives. A qualitative approach was considered for objectives one (1) and two (2) through the use of literature review. Also, to achieve objective three (3), a set of interview with experts and a quantitative method of multi-criteria decision making (MCDM) for analyzing the data was used.

1.8 Operational Definition

This study contains some key terms, which need to be clearly understood. These terms are further detailed with elaborate explanations under the literature review.

Construction: This involves all the business that builds houses and office facility, highways, and bridge, among others, and involves those people in specialized work like electrician, plumbers, masons, among others.

Lean Management: This is a continuous process improvement approach used to systematically improve quality and efficiency thereby reducing delays in activities and processes.

Delay: This is often described as a time overrun beyond a project completion date as specified in a contract for delivery of a project. In summary, a delay could be said to be a failure of a construction project to be completed within agreed schedule.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Delays are common in probably every organization and the construction industry is not an exception (Ibrahim et al., 2012; Memon, 2014; Memon et al., 2014; Zayyana et al., 2014). According to Ibrahim et al. (2012) and Sorooshian (2014), the construction industry has an essential role in the overall advancement of any economy; nonetheless, it has its own particular setbacks and challenges that ought to be studied in order to enhance the growth and productivity of the industry. Delays, which happened to be an inseparable part of any project, are a vital issue in construction projects. Delays are responsible for tremendous losses in invested capital and hamper the progress of the construction industry. Therefore, there is the need for critical assessment and comprehensive understandings of the main sources of delays in the industry (Memon et al., 2014; Zayyana et al., 2014; Norzima et al., 2011).

Delays in construction projects are often defined as the additional time needed before a project gets completed as compared to its original or initial time which was agreed by the client given the project and the contractor constructing the project (Kikwasi, 2012). The effects of these delays have often been described as very devastating on project parties, human lives and the economy as a whole (Hasseb et al., 2011; Ankit et al., 2013; Zayyana et al., 2014). As a result, the existing or employed project management methodologies have been questioned for not being effective and efficient enough in dealing with delays. A more robust approach known as "Lean" (Abdullah et al., 2010; Rahman et al., 2012; Koskela et al., 2013; Aziz & Hafez, 2013) has been contended to be introduced into the construction industry for minimizing the delays. In this chapter, the delay sources in construction projects have been assessed and some recommendations have been given for the consideration by project parties. Also, some suitable "Lean Tools" have been highlighted from Lean Manufacturing tools for the industry. The review is divided into two main sections; one section covers sources of delays; and the other covers lean tools. Section 2.2 explains delays, with subsections covering types, sources of delays. Lastly, section 2.5 explains "Lean" and highlights the tools suitable for the construction industry.

2.2 Review of Delays

Construction projects are normally considered successful when it meets schedule, expected cost, project and clients requirements. As a result of the superseding significance of project schedule for mainly owners and contractors; with regards to performance and budget respectively, Sorooshian (2014) in his analysis of Delay-Based Reliability on Construction Projects, described delays as an additional time taking for a project to be completed as compared to the agreed completion schedule. In essence, a delay is when the construction project is prolonged (Kikwasi, 2012).

It has been observed from literature survey that construction projects delays are a global problem and are found in almost all projects undertaking in the construction industry (Norzima et al., 2011). However, the magnitude level varies considerably across projects and geographical borders (Zayyana et al., 2014). Also, these delays occur at different stages from project conception through completion to maintenance; however, most delays occur at the execution phase (Sorooshian et al., 2010; Norzima et al., 2011). In this regards, it is evident and very essential for project managers and professionals to recognize the need to understand the main sources of delays in order to deploy practical strategies to mitigate and reduce the effects and risks resulting from delays. As stated by Kikwasi (2012), the effects of delays put construction industries at a great risk and affect the performance of construction projects.

There are a plethora of views on the sources of delays among project parties (Owners, Consultants or Engineers, and Contractors) in the construction industry. Some relate delays to project management deficiencies; others also contend that the problems are coming from the owners and consultants, just to mention a few. There are a lot of literature across the globe conducted to review the factors responsible for delays in construction projects. The studies of Bramble & Callahan (2011) on owner, contractor, design and other related delays revealed; late approval and late release of site to contractor, interference, financial difficulties, change orders, conflicts in contract administration as owner related delays; defects in construction, inefficiencies in the evaluation of site and design, management problems, etc., were also confirmed as problems related to contractors; design related problems included; defects in design, test and inspection delays, late review of shop drawings, etc.; labor disputes and strikes, and the weather were also found to be delaying projects but they stated that the project parties were not or directly responsible for such delays.

The main factors causing delays were assessed by El-Razek et al. (2008) in the Egyptian building construction industry. The survey reports indicated that the overall important factors included; contractor's financial difficulties; delays by owner in paying a contractor or partial payment; changes in design by the owner or his representative; and non-engagement of industry's practitioners or ineffective construction/contracts management. Also, from the studies of Mamman & Omozokpia (2014); availability of experienced and qualified personnel; raw materials and equipment quality; specification conformance; planned duration for project construction; resources availability for the planned project schedule; average delays by owner in making payment; information coordination among clients and project parties; cost of material and equipment were among the causal factors adversely influencing construction projects performance in Niger State, Nigeria.

The findings from Iyer & Jha (2006) found among other factors; project participants interactions; competency of owners, inter-project participants conflicts, social and economic hostilities, conditions of the weather, unawareness and lack of information and competition aggressiveness at the tender stage as factors affecting the performance quality of projects in India. However, in 2013, the survey by Desai & Bhatt (2013) in India reveals a new trend in the factors causing delays. Out of the 59 total factors causing delays identified under 9 major groups in their studies, the results indicated a total of 10 main factors; out of which 5 were ranked as being common by the methods used for ranking (i.e. relative index for importance and index for importance which was based on the level of severity and the level of frequency). These 5 included;

short contract duration, labors unavailability, material delivery delays, labors' low level of productivity, and delays by owner in progressive payments.

A survey was conducted by Ashwini & Rahul (2014) on large construction projects in India to assess the effects of construction delays on project time overrun. The views of project implementing agencies, clients, contractors and consultants were sought. The survey outlined the following delays: delays associated with the project implementing agencies included; land acquisition delays; contractor's mobilization delays; specification revision delays; problems with funding; among others. Delays associated with the client were; changes in the scope of work by owners; payment issues for completed works; low technical capabilities of owners; and others. The delays caused by contractors were; ineffectiveness in scheduling and planning; low level of experience and ineffectiveness in making decisions; etc. Likewise, delays caused by consultants comprise; specification revision delays; low level of coordination between consultants and contractors; and others.

In Jordan, 130 public projects were examined by Al-Momani (2000) for delay sources. School buildings, administration and office buildings, and facilities for communication and medical centers were among the projects that were examined. The findings concluded that changes made by users, climate, conditions at the site, delays in deliveries, increase in quantity and conditions in the economy were among the factors causing delays in Jordanian's construction projects. It was also observed that there was a strong correlation between the delay factors and contractor's failure and ineffectiveness in performance. In 1996, Ogunlana et al. (1996) considered Thailand specifically Bangkok for a survey. The survey concentrated on delays and overruns in building projects. Also, a comparison was made with other surveys on delays and overruns in developing nations. It was confirmed that in developing nations the problems facing construction industry can be clustered into 3 layers; inadequacies or shortages of resources supply; problems associated with consultants and clients; and contractor's incompetence.

A report from Saqib et al. (2008) on the variables influencing project implementation success in Pakistan, chose 77 variables, which were further clustered into 7 groups for respondents to score and rank. The report listed the following as critical success factors (CSFs); effectiveness in decision making; project manager's experience; contractors cash flow; experience of contractors, timely decision by client or his agent; supervision and management of site; effort in planning; prior experience of the project manager; ability of the client in decision making. Nonetheless, Haseeb et al. (2011) reported that in Pakistan, "acts of God" like earthquake and flood and others such as problems in payments and finance, inefficiencies in planning and management of the site, material and equipment shortages, etc, were most general factors causing delays. Change of government was also considered by them as being the most influential factor causing delays in big construction projects in Pakistan. They reiterated that new governments usually stop construction projects started by old government and propose a new design for construction and also bills are not easily passed by new governments. More also, in South Africa, it has been contended that the key significant factor hampering the success of project delivery is quality and attitude to service (Mbachu & Nkando 2007). All these studies confirm in one way or the other that there are serious delay problems in construction projects. Also, these problems are generated from different sources and may occur at different stages in the project construction (right from inception to completion and even sometimes maintenance period).

In his response to address a question of much intense debate on the floor of parliament in May, 2014, which was asked by the Member of Parliament for Pasir Ris Punggolin, GRC, in the person of Mr. Gan Thiam Poh, Mr. Lee replied that the Housing and Development Board in Singapore for the past 2 years has given an extension of time to about 36 failed projects. The reasons for such projects delays, he reiterated were design changes and issues relating to incremental climate (Channel News Asia, 2014). Also, Chua Chu Kang's MP by name Mr. Zagy Mohamad revealed some delay concerns in his estate. According to contractors as he reported, shortage of foreign labors is the causal factor for delays in his estate (Channel News Asia, 2014). Frimpong et al. (2003), undertook a survey on Ghanaian groundwater projects delays and overruns on cost and his findings included; payments delays for finished works as a result of issues in government bureaucracies; inefficient management of contract; low technical competence; material prices escalation; bad weather, etc. Ibrahim et al. (2010) indicated that the construction industry in Malaysia is experiencing a challenging issue of time overrun or a continuous delay since many years.

In order to establish comprehensive understandings of delays, this study addresses types and sources of delays in the proceeding sections.

2.3 Types of Delays

In order to establish comprehensive understandings of delays, the types of delays have been addressed in this study. There are four main clusters of delay types in terms of their operation contractually (Alaghbari et al., 2007; Tumi & Pakir, 2009) and a delay source identified in this study may have more than one type of delay:

(i) Compensable Delays (Arcuri et al. 2007; Tumi & Pakir, 2009).
(ii) Excusable/Non-compensable Delays (Arcuri et al. 2007; Alaghbari, 2007; Tumi & Pakir, 2009).
(iii) Non-Excusable Delays (Arcuri et al. 2007; Alaghbari et al., 2007), and
(iv) Concurrent Delays (Arcuri et al. 2007; Tumi & Pakir, 2009).

2.3.1 Compensable Delays

These delays are basically generated from the owner and his representatives. Errors in design, drawings and specifications are the most cited examples of this type of delay. When the owner or his representative fails to respond on time to a request made for drawings or information, payments requests, interruptions, and interference by the client, material, design or specification changes by owner, among others, delays of this nature may arise. This type of delay entitles the contractor to both additional time and money (Arcuri et al. 2007; Tumi & Pakir, 2009).

2.3.2 Non-Compensable/Excusable Delays

This type of delay is normally called "Force Majeure," meaning "chance or unavoidable occurrence." It is also known as "acts of God" because it is caused by nature and none of the project parties are responsible for it occurrence. In procurement, contractual and some legal agreements, there are clauses for "Force Majeure" that allow a time extension for contractors should in case these unforeseen circumstances delay a project. Even though time extension is allowed but according to Alaghbari (2007) and Tumi & Pakir (2009), there is no additional money given to contractors. Examples of these delays may include; hot and cold temperatures, rain, flooding, eruption from the volcano, earthquake, among others.

2.3.3 Non-Excusable Delays

Usually, the contractors and his subcontractors or suppliers are the causal parties involved in the generation of this type of delay. There is to some extent some entitlement in the form of compensation to the contractor from the subcontractor or the supplier if the delays are coming from them. The contractor receives no extra money and time or entitlement from the owner, however, through compensation or work acceleration the contractor has to make it up to the client or the owner (Arcuri et al. 2007; Alaghbari, 2007; Tumi & Pakir, 2009).

2.3.4 Concurrent Delays

This type of delay usually occurs in a situation where two or more delay factors or type overlap at the same time. For instance, when excusable and non-excusable types of delays occur at the same time, the resulted delay is a concurrent delay (Alaghbari, 2007). A conflict between the client and contractor may arise from this type of delay as excusable delay entitles the contractor for extra time but the client may turn down his request because of the non-excusable delay (Arcuri et al. 2007; Tumi & Pakir, 2009).

2.4 Sources of Delays

It has been observed that today's construction industry faces more challenges than before (Sorooshian et al., 2010; Norzima et al., 2011). Delays can create a huge cost for project parties; as a result, any delays in construction projects may cause serious problems to all the concerned parties and even the health of the economy (Zayyana et al., 2014). In this regards, having a thorough understanding of main sources of delays is crucial for reducing delays in construction projects (Sorooshian, 2014). This could only be achieved through identification of the real causal factors of delays in the industry (Norzima et al., 2011; Sorooshian, 2014). Following a comprehensive literature survey, two (2) main sources of delays were identified; Internal Sources and External Sources. Section 2.4.1 covers the internal sources of delays while as section 2.4.2 covers the external sources of delays.

The Internal sources emanate from the project parties or within the structure of the project including the company and it's management team, and these may include; clients, engineers, designers, consultants, contractors, subcontractors, suppliers, manufacturers, among others (Sorooshian, 2014). The external sources, on the other hand, do not originate from within the project or to some extent the project parties and therefore are difficult to control directly by project teams (Sorooshian, 2014). They are generally influenced by the external environment (Chan et al., 2004). The attribute used to measure the external sources affecting the success of projects according to Chan et al. (2004) are; political, economic, social, industrial relation, technological advancement, and physical environments. A detailed analysis and discussion have been provided in the proceeding sections below.

2.4.1 Internal Sources of Delays

A commonality within the construction industry is the inability to complete projects on time and within budget. But, successful construction projects are the result of multiple effective and quality decisions made by contrasting team members. Project teams and their decision-making processes, operations, administrative processes, experiences, skills and employed tools must be assessed to improve the likelihood of projects succeeding. Industry studies have demonstrated that meeting client's requirements are firmly impacted by the effectiveness of the project team.

For instance, according to Sorooshain (2014), the internal sources of delays occur due to malfunctions of any of the project parties including the designer, client, contractor and other parties, which provide labors, materials or services. Therefore, it is important to establish thorough understandings of the sources of delays in order to reduce delays. This could be achieved when all the crucial factors that are causing delays are identified. Also, the parties that are responsible for such delays ought to be identified in order to trace delay sources at different phases of the project and within any of the project parties (Sorooshian, 2014). Also, reports by Al-Kharashi & Skitmore (2009) indicated that the main sources of delays related to the client in Saudi Arabia included factors such as; work suspension, finance, orders changes in the government sector, material approvals from the client, slow paced process of decision making by the client, and technical submittals are low. Also, delays related to the contractor comprised; less qualified and inexperienced technical staff in the contractor's organization, problems associated with financing projects, inter-party conflicts, etc. More also, delays related to consultants stem from; inexperienced and lack of staff in the consultant office for design documents review. Unavailability of materials in the market for construction works and delays in the procurement systems were found to be the most causes of delays related to materials. Furthermore, unavailability of manpower and their low level of skills were causes relating to labor. Lastly, delays relating to contractual relationship and contract have its root source in an unrealistic timeframe.

Review and observations from the available literature indicate different groupings of the internal causes of delays (Norzima et al., 2011). For the purpose of this study, the available internal factors affecting delays from literature have been clustered into four (4) main broad sources of delays known as "The 4Ps Framework Analysis". The sources are; Project management sources; Project related or project scope sources; Project participants related sources; and Procurement related sources.

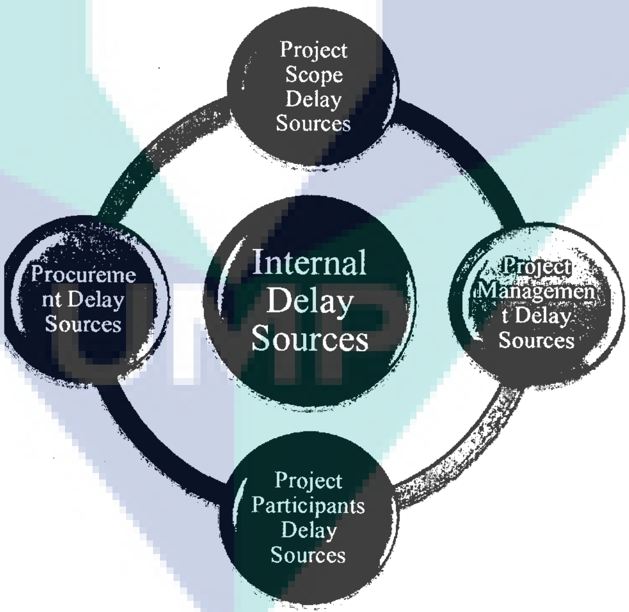

Figure 2.1 4Ps Framework Analysis

2.4.1.1 Project Management Related Sources

Generally, it has been acknowledged that contractors complete projects within the stipulated time as agreed upon (Sorooshian et al., 2010; Norzima et al., 2011). They should apply experience, skills tools, among others, to accelerate project completion within the contract duration (Sorooshian et al., 2010). However, the current practices of project management approaches reveal a different trend where delays in construction projects have been attributed to the failures of the employed project management approaches (Norzima et al., 2011).

The models behind construction management and project management methods have failed to deliver projects on time (Aziz & Hafez, 2013). There are various sources of project management related delays and these may arise from the following; capabilities in feedback, effectiveness in coordination and making of decision, the structure of project management, frequent communication, troubleshooting, prior experience of management, monitoring, scheduling and planning effectiveness, and some among others (Norzima et al., 2011; Shehu et al., 2014). Others may also include; project management capabilities, health and safety programs, monitoring of subcontractors' works, managerial support and actions, etc.

2.4.1.2 Project Related Sources

These sources include scope, health and safety, and other inherent risks. Walker (1995) reported that the most useful tool for predicting time is the scope of a project. Many researchers have also confirmed the significance of the use of the scope of the project (Ramabodu &Verster, 2010). The attributes considered for evaluating this source are; project's size, project's nature, project's complexity, project's type, health, and safety, among others. All these attributes may lead to time and cost overruns if not regulated effectively. It must be emphasized here that because of the significant nature of scope, any change in scope could lead to a delay. This is because the scope is the prime focus of any project and other variables such as budget, estimation, project plan, schedule, project quality, just to mention a few, are heavily dependent on the project scope. There is high tendency of project failure should any omission, adjustment and alteration occur in the scope of the project in the execution stages; that is, the laid out plan for the project would have to be assessed and modified and this might come with its own budget and schedule (Walker, 1995). It is, therefore, keen for project managers, clients and all the parties involved in a project to effectively regulate and stick to the project scope as its changes may result in change orders and eventually lead to cost and time overruns (Ashwini & Rahul, 2014).

2.4.1.3 Project Participants Related Sources

The main project participants causing delays are as follows; Client/Owner, Designer/Engineer, Consultant, Contractor, and Subcontractor or Supplier (Owolabi et al., 2014; Ashwini & Rahul, 2014). These sources have further been categorized into; Client Related Sources; Consultant Related Sources; Design Related Sources; and Contractor Related Sources.

(i) The Client Related Sources: Mostly consist of; the knowledge and experience of the project by client, type of client (public, semi-public, private, etc.), financial capabilities, skills in managing project, risk aversion skills, trust towards the project team, well-laid out scope, etc. (Aziz, 2013; Owolabi et al., 2014). Commonly, joint ownership conflicts, change in orders, design documents approval delays, problems in funding resulting in delays in progressive payments, low level of technical staff in the client's office, work suspension by owner, method of tendering or bureaucratic processes in bidding, unqualified contractor selection, owner's low level of experience in construction project, ineffective coordination and communication between client and the contractor, just to mention a few (Aziz, 2013; Owolabi et al., 2014; Ashwini & Rahul, 2014).

(ii) The Consultant Related Sources: These sources are associated with; the effectiveness of coordination and communication between the consultant and the contractor and again the consultant and the engineer, construction project experience, testing, and inspection, work approvals, etc. The most common examples of delays are; low level of experience in construction project by the consultant, scope changes approval delays, testing and inspection delays, inaccuracies in the investigations of sites, delays in design documents reviews and approvals, ineffective communication between consultant and contractor, frequent disputes with design engineers, etc. (Aziz & Hafez, 2013; Ashwini & Rahul, 2014).

(iii) The Design Related Sources: These sources according to Chan & Kumaraswamy (1997) involve; the experience of the design team, complexity in project design and design documents production mistakes or delays. More also, examples of design related delays include; changes in design by owner or his representative, omissions and errors in design by designers, low level of experience of the design team, low level of modern design software usage, incomplete and defective designs, misunderstanding or misinterpreting of client's requirements by design team, etc. (Aziz, 2013; Ashwini & Rahul, 2014).

(iv) The Contractor Related Sources: These sources include; experience and knowledge of contractor, management of the site, subcontractor's supervision and involvement, financial capabilities, effectiveness in cost control systems, etc. (Aziz, 2013, Shehu et al., 2014). Contractor inadequate experience, use of old technology, project team's incompetence, ineffective coordination and communication between contractor and client or consultant, inefficient supervision and management of site, errors in works, which usually result in reworks, poor scheduling and planning of project, etc. (Aziz & Hafex, 2013; Owolabi et al., 2014).

It is intriguing to note that, project parties sometimes attribute causes of delays on each other, a situation that could possibly be referred to by this study as "Constrpolitics," that is, "Construction Politics" or "The Blame Game". In their quest to understand the actual factors causing delays in large building projects as well as the relative importance of the factors, Assaf et al. (1995) outlined about 56 factors causing delays in Saudi Arabia. Factors considered as most important by the project parties included the following; contractors views indicated that there were delays in drawings preparation and approvals, delays by owner in progressive payments and changes in design by owner were also common; the engineers and architects also attributed causes of delays to financial problems during construction works, ineffective relationship from the contractors and slow paced process in decision making by owners; owners also related the delays to errors in design, unavailability of labours, inadequacies in the skills of labours, among others. Likewise, their findings on the variables causing delays in Lebanon's construction industry regarding the view on owners, contractors and consultants on most influential delay factors confirmed that; owners were very concerned about financial issues; the most important issues to contractors are contractual relationships, and project management issues were most important to consultants (Mezher & Tawil, 1998).

2.4.1.4 Procurement Related Sources

The procurement systems in the construction industry have been an area of immense interest and intense debate. This is because procurement is at the center of the industry as it brings the resources both team for managing the resources or building the project and the material resources for the life cycle of the project and also to bring to bear the intended project plans into successful completion. Procurement is the system through which the construction industry secures and carries about projects. However, there have been concerns about problems associated with the selection of procurement methods for design and the adopted procedure or method for the project and tendering (Alaghbari et al., 2007). Examples of the sources of these delays from studies were; unavailability of materials and its price escalation, inefficient supervision and management of materials, ineffective material procurement, and delays associated with delivery of materials contracting and tendering disputes, funding problems, inaccuracies in the estimation of materials, unclear and ambiguous contract, etc (Moubaydeen et al., 2013). Unclear clauses in contract agreement can bring disputes that may lead to cost and time overruns. In addition, selecting unqualified contractors, estimations, and bidding differences could be potential for delays.

Throughout literature survey, the internal source of delays seems to represent the bane of delay sources and their associated risks. Out of the 93 total sample of questionnaires sent for data collection to analyze the causes of delays and their effects on the delivery time for building construction projects in Nigeria; lack of funds for financing a project, changes in drawings, inadequate information from consultant, slow-paced decision making process by the client, ineffective communication among project parties, inconsistencies and mistakes in contract documents, payment for completed works, building material prices fluctuations and others were found among the factors causing delays in construction projects delivery time (Owolabi et al., 2014). Also, Chan & Kumaraswamy (1996) conducted a more extensive study on potential delay in Hong Kong using 400 questionnaires after which follow-up interviews were held. From the point of view of project parties including the clients/owners, consultants and contractors, there were 5 common and significant factors causing delays and these included; inefficiencies in both supervision and management of site; unforeseen conditions in the ground; variations works initiated and required by clients and slow paced process in decision making by clients.

The findings of Faridi and El-Sayegh (2006) established; inadequate manpower skills; inefficiencies in both supervision and management of site; poor leadership; breakdowns and unavailability of equipment; drawings preparation and approvals; slow paced process in decision making by owner; financial problems during construction works by contractor; drawings or documents or specifications incompleteness; lack of planning in the early stages of the projects; manpower skills; materials unavailability on time; manpower's productivity; inefficiencies in both supervision and management of site; delays in approval or permit from government departments or municipality; delays in progressive payments of finished works by owner; just to mention a few, as factors contributing to delays in UAE's construction projects.

Also, Rohaniyati (2009) concluded that factors causing Brunei construction industry's delays consisted of; ineffective communication among project parties (owners, contractors, and engineers), slow paced process in decision-making and regular changes in orders by owners, ineffective planning and lack of experience by the contractor, issues relating to payments of finished works, lack of subcontractors experience were reported as issue affecting critical success. Manager's experience and abilities, project's scope clarity, the definition of work, control systems usage, commitment on goals by the project manager, motivation of project teams, adherence to safety requirements and procedures were some of the findings asserted to be crucial in avoidance of delays which are critical to the industry.

2.4.2 Assessment of 4P and Types of Delays

In addressing the synergy between the 4P and the types of delay from existing literature, it could be observed that each 'P' may have one or more type(s) of delay(s). For instance, project scope may be said to be associated with compensable delay if the changes in scope were caused by the client or his representative. If the changes in the project scope were caused by the contractor, supplier or subcontractor, then it could be said to be a non-excusable delay, however, the contractor is entitled to some form of compensation from the subcontractor or the supplier if the delay is caused by them. In a situation where the delay is caused by both the client, his representative and contractor, subcontractor or the supplier, it could be said to be a concurrent delay.

Again, project management could be related to compensable or non-excusable delay or concurrent where both delay types overlap. More also, in project participant source when a delay is caused by client or his representatives such as consultant, client's design and estimation team, it is a compensable delay. However, when it is caused by the contractor, subcontractor or the supplier or in-house design and estimation team, it is a non-excusable delay. There may be a situation of concurrent delay as well.

Mostly, procurement delays are non-excusable as they are caused by the contractor and his supplier. Finally, there may be situations where hot and cold temperatures, rain, flooding, eruption from the volcano, earthquake, external forces, among others, can cause scope changes, procurement or project participant delays. This situation could be said to be the excusable or non-compensable type of delay.

2.4.3 External Sources of Delays

One noteworthy gap in the management of projects has been observed to be considering projects as systems existing in isolation from its surrounding environment. From an examination of the deficiencies in such an approach and how to avoid them, an understanding of the concept of the environment has been provided in this study. While many variables have been found to influence the processes and systems in the construction industry, the management of the environment is deemed to be essential to project performance. This is because failure or success often depends on variables in the environment and the degree to which these forces could be identified, assessed, and evaluated by managers will have a positive or negative influence on project performance. It is very imperative for industry's practitioners to note that organizations do not operate in vacuum and therefore assessment of the opportunities and threats provided by the challenges of the environment is critical for formulating and deploying developmental and environmental response strategies against the forces which inevitably impinges on its decisions, directions, actions, size, health, profitability and performance as a whole.

It is noteworthy to mention that the modern business environment is operating in a highly turbulent time and this places the construction industry in a very tenuous position. Demand for operational activities to achieve effectiveness and efficiency, the environment has increased the need for organizational accountability both in private and public sectors. The project environment in many developing and developed countries present unique challenges for projects and even human lives that almost presuppose cost and time overruns even before the commencement of a project. Time is very important to the project parties and this is because any delays in the project scheduled are often devastating and affect the health of the economy (Hasseb et al., 2011; Ankit et al., 2013). Delays stifle performance and growth of the construction industry. Based on the research by Sorooshian (2015), performance of construction projects in Iran was not ideal! (It was moderately acceptable only!). Many construction projects have reported delays or poor performance because of many evidential environmental specific issues ranging from political, economic through to geological conditions. There is, therefore, the need to understand the environment in which a system is running in order to formulate developmental and implementation strategies.

In 2005, Muir (2005), stated in his book "Challenges Facing Today's Construction Manager" that, issues relating to the environment and its impacts has been on the increase since 1970's. Environmental issues affect almost all the sectors and segments of the construction industry. He concluded that even though the environment is considered as being outside construction, there are challenges that the environment poses to managers of construction works that are regarded as being part of the business landscape and these challenges consist of; regulations from the government, legal and environmental concerns and pressures coming from the social and political factors. Outstanding managers in the construction industry understand and find a way out of these issues. These managers can handle the difficulty associated with the environment, have a competitive advantage and make the best out of risky situations. It is imperative to note that, the degree to which these forces could be identified, assessed, and evaluated by managers will have a positive or negative influence on the performance of projects.

Kuye (2004), emphasized that, the need to study business environments is very important considering the fact that business organizations do not operate in vacuum and an effective management in complex and dynamic society requires the assessment of strengths and weaknesses of the organization and the opportunities and threats provided by the challenges of the external environment, hence, for the survival and growth, organizations must cope and adapt to these challenges posed by the ever-changing environment in which managers operate. This means that managers must not only be aware of what constitutes the elements of their business environment but also should be able to respond to the forces of the environment that inevitably impinges on the operations of the business organization. Youker (1992), described construction environment as the aggregate of surrounding things, conditions or influences. In order to avoid any problem within the construction project process, Bennett (1991), advises that, environmental factors should be a touch point in the management of construction projects. He reiterated that there is interference from the environment against the progress planned for the construction project. The term “Environment” in management does not necessarily mean physical surroundings, but, it is used as total forces, factors and influences that surround and affect business organizations as a separate entity as well as other business organizations. This means that business organizations must interact with those forces that influence its decisions, directions, actions, size, health, profitability and performance as a whole.

It is very substantive to caution that because of the effects of the environment on construction projects performance, having a comprehensive understanding of the main causal variables of delays is key for effective mitigation of the challenges in the environment and its associated delays in the industry. Therefore this section presents the concept of project environment and investigates the environment through PESTLE Framework Analysis. The section has systematically analyzed and categorized external delay sources into fundamental groups known as “PESTLE” factors. PESTLE consists of political; Economic; Social; Technological; Legal and Environmental (Physical

Environment). These variables form aspect of the external environmental analysis considered under this study for carrying out investigations to understand the diverse variables and sub-variables in the macro environment which influence the performance of projects (Collins, 2014; CIPD, 2015).

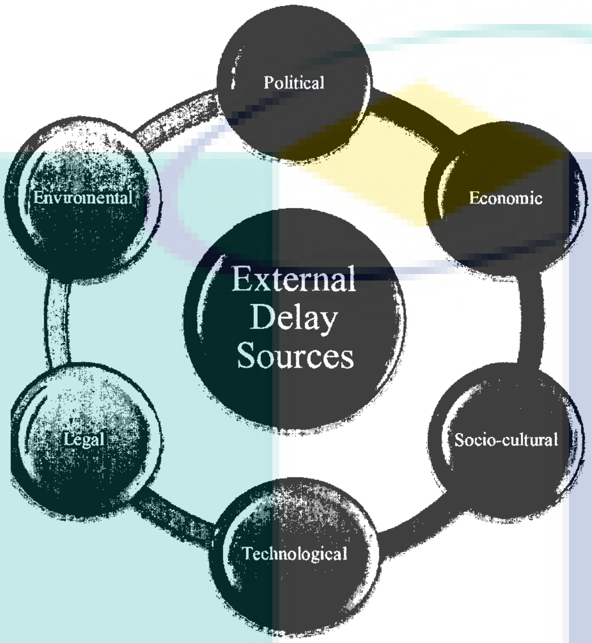

Figure 2.2 PESTLE Framework Analysis

2.4.3.1 Political Sources

The construction industry is situated and operates within the covers of the political atmosphere that have restrictions and regulations. The central or local government, and other semi-public departments and governmental channels play significant roles in the construction industry. Governments in almost every economy are presented as the regulators and the main clients. On the hearts of every government are initiatives, decisions, policies and schemes to stimulate, improve or protect the economy and fulfill some specific agenda. However, these agenda may come with its own associated advantages and disadvantages on the economy. The impacts of some of these policies sometimes present a greater challenge for businesses and pose dangers to all the sectors especially the construction industry in the economy. Some of these dangers consist of political events such as; terrorism, revolutions, wars, demonstrations and civil strives, etc.; inactions and actions such as; nationalization and discriminatory treatments, changes in regulations, laws and policies, restrictions, bribery and corruption, expropriation, confiscation, etc.; and actions of powerful groups such as; environmental and union activism (Ling et al., 2010; Akanni et al. 2015).

In 2010, a study was conducted in the construction project environment in Vietnam. The investigation concentrated on factors faced by international firms including; political, economic and legal, termed as PEL risk factors. Detailed questionnaires for face-to-face interviews were sent to 18 professionals who were involved in the management of construction projects in Vietnam. The professionals were from Hong Kong, Singapore, France, United States and Malaysia. The main risk factors as collated from professionals included; system administrative bureaucracy for obtaining approvals and permits, exchange fluctuation, public projects terminations, corruption, inconsistencies and changes in regulations, escalation of interest and inflation rates and poor legal framework. They concluded that the most severe risk factors encountered by international firms in order of magnitude were political, legal and economic respectively. They recommended that because of the nature of political risk, an antigraft training should be provided to the staffs who reside in Vietnam. They repeated that foreign firms should avoid projects from the public sector; bid for shorter duration projects; secure insurance for political risk; and obtain permits and approvals through local partners (Ling et al., 2010).

Voelker et al. (2008), said the construction industry is very sensitive to fluctuations that arise from the political environment. This is because any changes made by the government or his representative may affect estimation, budget, schedule, etc. Therefore, project teams must constantly scan the environment to understand the system and the time in which they are operating in and make arrangement to cater for any lapses that the political environment might pose. The questions that project teams should be asking here are; how and to what degree do interventions from government, interest, reaction to tax policies, corruption, inertia in government bureaucracies, environmental and labor laws, restrictions on trade, changes in taxes, increase in fuel prices, inflation, instabilities in the political system, materials scarcity, changes in government regulations and market conditions, difficulty in assessing credit facilities, just to mention a few, in the economy affect construction projects? In order to effectively address these questions, a routine industrial retrospective inspection should be undertaken by project teams, industrial practitioners, and governments to understand the eco-political (Economic and

Political) dynamisms and complexities and devise corresponding strategies to deal with its aftermath.

2.4.3.2 Economic Sources

The health of every economy within which construction industries operate affect all the parties involved in the construction projects as well as demand for commercial and residential properties. This is because a healthy economy usually boosts industrial performance and subsequently, the performance of projects. Dealing with government policies whether, micro or macro in the construction process directly affect the design teams, clients, and contractors. Policy instruments concerning with the growth rate of the economy, stability or fluctuation of price, competition in the market, income distribution equality, availability of resources, import and export regulations, etc., and fiscal policy like taxation, among others, have direct or indirect consequences on the construction process. In addition, changes in the monetary policies by governments as an attempt to regulate the supply of money, exchange rates, interest policies, and supply-side policies come with benefits and disadvantages and have the potential of influencing construction projects performance. The power of these policy instruments can attract investors and boost the economy and subsequently projects performance or it may affect estimations, bring about an increase in costs for funding contracts and projects, and this may also result in abandonment of some jobs (Lingling & Hongchang, 2011; Akanni et al., 2015).

The focus of the increasing interest in the industry should be diverted to the whole project life cycle cost, namely; initial capital costs, operating and maintenance costs and how better design and planning can be used to improve all these costs from the economy. The questions that project teams should be addressing here are; how do project teams react to changes in taxes, changes in input prices or inflation, scarcity of materials, problems with cash flow, difficulty in accessing credit facilities, changes in government regulations and changes in market conditions, just to mention a few? To answer these questions, project teams should establish an understanding of how the economic environment operates. Also, project teams must fully assess the economy and undertake financial viability studies in every construction work. The costs associated with construction, management, design, conservation, maintenance and renovation and all that is required must be assessed because construction industries across the world inevitably work within a general economic and financial constraint environment. As a result, cost-benefit analysis and realistic budgets must be established through reliable forecasting, risk assessment and cost estimation and control.

In almost all the literature reviewed, financial difficulties in the owner's and contractor's organizations were most recorded variable for delays across national borders and across projects. Akanni et al. (2015) reported that, within an unstable economic environment, it is the responsibility of project managers to guarantee the financial viability of a project. Accuracy in forecasting of the trends in both local and global economies is crucial as periodic cycles of the economy considerably shape the construction industry's activities.

2.4.3.3 Socio-Cultural Sources

The socio-cultural facets of a nation or group of people must be understood by organizations that are operating within the confines of such environment (Jiang, 2011). There are lots of interactions that take place between the people in the society and the organizations that undertake their activities within such society (Muir, 2005). It is, therefore, paramount that the social and cultural factors such as the rate of population growth, birth and death rate, age distribution, access to social amenities like medical care, housing, electricity, telecommunication, good road networks, be investigated. Also, the level of education and unemployment, striking and demonstrations, the level of human rights activism, proliferation of the mass media and its independence, crimes and other social vices, attitude to work, respect for leaders, superstitions, lifestyles and values, among others, impact heavily on the performance of industries (Jiang, 2011; Taherkhani et al., 2012; Enida & Vasilika, 2013).

Furthermore, the demand for a company's product or service is greatly affected by the trends in the social factors. Similarly, if too many of the people are in the aging population, it signals less willing and small labor force. For instance, shortage of manpower supply may be as a result of qualified people in terms of education and experience or low workforce in the society (Enida & Vasilika, 2013). As the construction industries in most countries are composed of many nationals, sometimes working together, it is the responsibility of the project management team to shave and harness all these differences into an advantage. The differences may manifest in the form of communication problems, attitude to work, respect for authorities, beliefs and values, lifestyles and habits, just to mention a few, that impact negatively on project performance (Taherkhani et al., 2012; Enida & Vasilika, 2013). It is demonstrated that there is a greater input from the community through citizenry participation in the initiation of project, design, and construction. Also, there is much greater accountability to the public than in the past by today's construction manager. Pressures from the social and political environment, especially NIMBY syndrome (not in my back yard) stifles growth and development and subsequently hampers construction projects development (Muir, 2005).

2.4.3.4 Technological Sources

The environmental and ecological aspects such as research and development activities, change in technology and automation are influential to construction projects' performance as well as the whole industry (Goodrum & Haas, 2002). They can impact on the level of production efficiency, make communication easier and connect project teams or parties across distance and boundaries. Likewise, it can enhance effective dissemination of information through a common platform as one of the most delay sources is ineffective communication. Also, any swing in technology can adversely cause changes in quality, costs, and duration. Goodrum and Haas (2002), indicated that the level of the efficiency of construction operations today is as a result of advancement in technology. Cost reduction and operational efficiency can be achieved using advanced and mobile technologies and information technology solutions in the construction industry.

After a careful examination of 200 activities for more than 22 year period in the United States construction industry, Goodrum & Haas (2002) reported that, there have been a considerable impacts on several kinds of equipment technology that have affected the construction industry as a result 5 factors in technology; energy; information processing; control; ergonomics; and range in functionality. The construction industry's use of (i) 3D and 4D Model Application for analyzing design options/building operations, photorealistic rendering, virtual design review, estimating cost, construction operations' analyses, production of document, preparing bid package, (ii) Application of sensing technology for detecting hazards, reducing and mitigating the risks associated with the construction project, (iii) computer programs application DSS (Decision Support System), have enhanced construction project administration and conflict resolution under uncertainty (Goodrum & Haas, 2002).

There is no indication that technology will be stopping. This is because every day new technologies are developed to solve some of the problems the world faces. It is, however, important for project teams and industry practitioners to constantly upgrade or update themselves and also adapt to the new technology and its revolution because technology brings enhancement and provision of tools that are vital for design and civil infrastructure works as well as managing, protecting and facilitating project teams' activities.

2.4.3.5 Legal Sources

These sources are generally the established regulations, rules and principles enacted through different legislations to control activities of companies and individuals in the society. Governments pass and enact various Legislative Acts to ensure the wellbeing of the economy, protect assets and individual rights, among others. Sometimes due to the changes in the trend of activities of individuals and organizations and the need for the government to fulfill certain political agenda in the economy, new regulations and/or changes in the existing legislative acts are effected (Moubaydeen et al., 2013). These regulations are becoming very complex and affecting every organization or companies in the society more directly. There is increasingly difficulty faced by businesses today to conduct their activities without stumbling upon sets of laws and regulations. Even though, legislative instruments such as: codes of practice; environment regulations like laws for green building, pollution control, building performance, natural resource usage, building contract, energy management, etc; safety laws; antitrust laws; consumer and discrimination laws; labor and licensing regulations; laws for taxation and insurance; and others are predictable with some level accuracy, however, observations from Akanni et al. (2015) suggested that problems could occur when there are changes in taxation, industrial safety and environmental regulations during the time that project construction works are ongoing.

The effects of these laws are common, mostly during licensing, obtaining permits, designs and shop drawing approvals, contract disputes, among others. Similarly, the contractual agreement regulating scope, schedule, price, and others, from design through to completion and maintenance have complexities that may result in disputes between clients and contractors (Moubaydeen et al., 2013).

Also, a report from Moubaydeen et al. (2013) showed that Qatar's construction contracts have high risks transfer to contractors and consultants. The extent of the transferred risk is however not clear because contract amendments are poorly drafted or have some peculiar conditions. These risks are often tight deadlines and provisions for extensions are discretionary or vague. Also, in a situation where an extension is granted, they are only a liquidated damages relief, but rights for associated expenses and losses may not be allowed. Provisions for obligations on the part of the clients to approve a request or instruction are also at the discretion of the client or his engineer. Besides, contracts provide for very tight time-bar clauses for contractors to challenge clients and when contractors miss the deadline it often means no further rights. More also, requirements and specifications that have been considered within the scope of contracts are vague and are subject to instructions from the client. This makes pricing or costs very difficult because quality and time provisions are not clear in the legal conditions and terms (Moubaydeen et al., 2013). The effects of the legal environment on the performance of construction projects can never be understated and project teams are advised to navigate through these realities in order to gain competitive advantage.

2.4.3.6 Environmental Sources

The construction industry is sited within a location that has different geological and demographic features. The geological setting of a project, conditions in the ground and patterns of the weather or change in climate are some of the examples of physical environmental sources that have affected and still affecting construction project development (Akanni et al., 2015). The unpredictable nature of most of these sources places construction industry in a tenuous position as its occurrence cannot be prevented. This situation even becomes more apparent and catastrophic in areas or geographical locations which are prone to natural disasters.

Nonetheless, Akanni et al. (2015) anticipate that management of construction works considers the significance of devising management strategies in their planning to deal with the physical effects of these sources that try to destroy resources available. He reiterated that there should be growing climate change awareness among project teams and parties, management, departments, labors, industrial practitioners, etc., on the diminishing and destructive effects presented by the physical environment on projects, infrastructures, and even human lives. Also, issues relating to air quality or ventilation, quality of water, temperature or water table (hot and cold conditions), level of noise, dust, lighting (light intensity) and its effects, health and safety, just to mention a few, have to be addressed at the various sites and project environs. These factors have strong adverse effects on the performance of construction project works. Health and safety management must be integrated into the culture of the contractor's organization and training and scrutiny must be routine at project sites, contractor's camps and facilities. This is because construction operations are usually sensitive to climatic conditions and patterns and adverse weather such as temperature, wind, snow, humidity, rainfall, etc., can cause delays and cost overrun, mostly prompting contractors for additional budget and time claims submission (Alaghbari et al., 2007). The difficulty in such claims may even result in conflict between the client and the contractor because the challenges connected with quantifying the degree at which construction delays were caused by the unfavorable climatic conditions (Alaghbari et al., 2007). It was reported in Southern California that in bad weather, workers cannot always complete a task. Rather than work with low productivity, contractors prefer to delay the start of an activity until sufficient productivity can be maintained (East et al., 1992).

2.4.4 Summary of Internal and External Source of Delays

The identified internal variables which had been clustered into four (4) main sources (4Ps- Project Management Related Sources; Project Related or Project Scope Related Sources; Project Participants Related Sources; and Procurement Related Sources) and their impacts on construction projects had been evaluated and analyzed through the 4Ps framework. The Review analyses showed that the major internal sources of delays are associated with the '4 Ps'. Likewise, these sources have significant effects on construction projects with regards to time, cost, quality and the overall client's requirement(s). Essentially, the result of the findings indicated that there is an inherent situation known as "The Blame Game" or "Constrpolitics" among project parties and this seems to be a global phenomenon. This situation could be a host that could breed irresponsibility resulting in failures in construction projects. It is, therefore, imperative for project teams and industrial practitioners to undertake a routine industrial introspective scan to understand these sources and devise appropriate strategies to deal with them. It is expected that the framework in this study will be used for project performance assessment studies and serves as a benchmark for the industry.

Likewise, the identified external variables, which had been clustered into six main sources (PESTLE-Political, Economic, Social, Technological, Legal and Environmental) and their impacts on construction projects, had been evaluated and analyzed through a comprehensive literature survey by the authors. It was observed that these sources have significant effects on construction projects with regards to time and cost overruns and the overall performance of the construction industry. The result of the findings from the literature survey indicated that the risks and the effects of the external environment on construction projects are a global phenomenon; however, the level of the magnitude may be unique to a particular project and geographical boundary. It is, therefore, advised that a routine industrial retrospective scan should be undertaken by project teams, industrial practitioners and governments, to understand the dynamisms and the complexities and devise corresponding strategies to cope and adapt to the challenges posed by the ever-changing environment in which the construction industry operate. Governments might likewise investigate the variables and create the eco-political stability that builds trust in international construction companies and other investors. It is expected that this framework and the key criteria identification will improve understandings of project teams and industry practitioners, employ as a systematic framework to categorize external delay sources in construction projects, contributes to the knowledge and practice of delay control in the construction industry.

In order to investigate and address the concerns of delays and effects of these delays sources, a set of lean management tools have been outlined in the next section. The purpose is that identification of the delay sources alone without identification of reliable management tools for which successful elimination of delays depends may not effectively solve the problems in the construction industry. The lean management tools identified from literature review will further be ranked based on their effects on controlling the sources of delays. It has been argued that the adoption of lean management tools in construction projects will effectively reduce or minimize the delay problems in the industry (Rahman et al., 2012). This was echoed by Muhammad et al. (2013) who argued that the construction management systems used currently ignore the effects of the important production system variables such as cycle time, work in progress and throughput, but these variables are interdependent, related and can influence construction cycle significantly, as discovered through their study.

2.5 Introduction to Lean Construction

There is no dought that lean construction is the way forward for construction industries around the world, especially Malaysia. About 57% of productive time waste are said to exist in the construction industry (Lean Construction Institute, 2015) and this calls for research and the use of robust and radical techniques to solve the problems the industry faces (Lajevardi et al., 2011; Zahidy et al., 2015). The conventional approaches to construction project management have inadequacies in addressing the challenges in the industry (Lajevardi et al., 2011; Gonzalez et al., 2013). Conversely, lean production management and techniques provide the foundations for waste minimization or its total elimination from construction projects (Muhammad et al., 2013). One of the most effective approaches for reducing delays in Malaysian construction projects is through lean tools adoption (Nikakhtar et al., 2015). Even though Malaysian construction industry is still evolving, there is neglect of the benefits of lean tools adoption in the industry (Muhammad et al., 2013). Meanwhile, other industries have been reaping the benefits of using lean tools (Schweikhart & Dembe, 2009; Salimi et al., 2012; Koay & Sorooshian, 2013; Anvari et al., 2014; Alireza & Sorooshian, 2014). Similarly, other construction industries elsewhere have found lean tools to be effective in delay control (Sacks et al., 2010; Marhani et al., 2013; Sarhan & Fox 2013; Aziz & Hafez, 2013). The Malaysian construction industry is suffering from issues of high delays and low productivity and the only feasible method to cope with this situation is to adopt the lean methodology, and it will be more significant that lean tools are applied by all stakeholders involved in Malaysian construction industry (Muhammad et al., 2013). The concept of LC as indicated by many researchers leads to improved delivery systems and processes through the elimination of wastes, increase productivity, fulfill client's requirements, ensures environmental sustainability and improve overall project and financial performance

(Lajevardi et al., 2011; Gonzalez et al., 2013; Koay & Sorooshian, 2013). There is, therefore, the need for projects teams to deal with the issues of delays wastes in projects through the adoption of lean production systems in the construction industry, especially in Malaysia. This section discusses the concept of LC and highlights the significance of its application in the construction industry.

Firstly, projects have been considered as temporary based production systems which need to be designed, planned, produced and delivered within a specified time (Rahman et al., 2012). It is asserted that fast, complex and uncertain projects cannot be managed through the conventional ways and that fast track projects with long, complicated supply chains involving many players and subject to multiple, extensive process design changes have complex flow management that has failed miserably. As a result, the industry is characterized by delays and often has suffered cost and time overruns (Sorooshian, 2014). In general, a very high level of delays or non-value added activities is confirmed to exist in the construction industry (Lajevardi et al., 2011; Nikakhtar et al., 2015).

Several studies from various countries have confirmed that delays in construction industry represent a relatively large percentage of production cost. The existences of a significant number of delays in the construction have depleted overall performance and productivity of the industry and certain serious measures have to be taken to rectify the current situation (Aziz & Hafez, 2013). According to Rahman et al. (2012), the traditional approaches to construction or the conventional project management approaches have inadequacies in resolving the problems in the industry. However, lean manufacturing principles and techniques provide the foundations for minimization or total elimination of the delays faced by the industry (Muhammad et al., 2013).

Lean construction has changed the traditional view of labor flow and workflow reliability which were considered the most determinants of constructions works and has embraced the concept of flow and value generation (Rahman et al., 2012; Aziz & Hafez, 2013). Explicitly, the application of lean tools and lean thinking practices in construction projects is increasingly becoming a must for any construction company to succeed in the current industry (Sacks et al., 2010; Salimi et al., 2012; Marhani et al., 2013; Sarhan & Fox 2013; Aziz & Hafez, 2013; Muhammad et al., 2013). The intensity of the pursuit for the operational application of lean tools in the construction projects is on the increase; this is due to the realization by construction companies of the potentials of an effective lean project development process in reducing project completion time, engineering hours, design and supply chain management integration, ease in constructability, environmental sustainability, flexibility, process control, and increased in the quality of new projects (Rahman et al., 2012; Aziz & Hafez, 2013; Marhani et al., 2013; Sarhan & Fox 2013; Muhammad et al., 2013; Nikakhtar et al., 2015).

This section seeks to establish the fact that lean construction presents a new and robust approach to dealing with the delays in the construction industry which the current or conventional project management models have failed to control.

2.5.1 The Conventional Project Management Methods

Generally, effective project management approaches must facilitate the achievement of project goals (Sorooshian et al., 2010; Norzima et al., 2011). However, according to Zahidy et al. (2015), the current construction management models and project management practices have failed to deliver projects on time. The failures of current project management help define the requirements for a new approach (Rahman et al., 2012). This was echoed by Koskela (2013) who argued that there is a mismatch between the conceptual models of project management and the reality observed. This highlights the lack of robustness in the existing managements' concepts and therefore calls for production theory in construction. This new approach must rest on the expanded Transformation (T), Flow (F), and Value generation (V) foundation to optimize performance in projects, (Koskela et al., 2013; Aziz & Hafez, 2013).

The responsibility of the project management team is to deploy techniques for meeting and controlling schedule and budgets instead of outlining justifications or reasons for not meeting them. This tells management of a project that there are no authentic explanations for failing to meet schedule and budgets. The outcome is the inability to identify and follow up on reasons why planned work is not accomplished, and inability to learn and improve (Aziz & Hafez, 2013). There is an assumption that all work and resources could be coordinated by schedule and those inabilities to perform to the schedule are uncommon or proof of the absence of responsibility (Aziz & Hafez, 2013).

From a lean construction viewpoint, project management practices today rests on the defective model and its control (Lajevardi et al., 2011; Zahidy et al., 2015). Basically, current project management endeavors to manage activities through scheduling and to control them utilizing output measures. This fails even in the effort to manage those activities and misses completely the work process management and the creation and value delivery (Aziz & Hafez, 2013). In this dynamic project environment, activities are rarely connected together in just a simple consecutive chains; rather work between and within tasks is connected to work with others through shared resources and/or relies upon work in progress in others, and therefore coordinating projects in such environment cannot be guaranteed even with very detailed critical path method schedules. Also, in these instances, the reliable release of work starting with one group then onto the next is assumed or overlooked (Aziz & Hafez, 2013). Project managers who depend on these schedules battle with uncertainty yet rarely see it emerging within the project from their dependence on the scheduling of tasks and control of activities (Aziz & Hafez, 2013). More also, an examination of the failures in using scheduling for projects by Gonzalez et al. (2013) likewise demonstrated that regularly just around 50% of the tasks on week by week work plan are finished before the end of the planned week and that most of the failures in the planning could have been moderated or controlled by contractors using an effective variability management, beginning with the project structuring (as a temporary based production system) and continuing through its operation and improvement.

There are among others three distinguishing features between LC practice and conventional project management, specifically: a) LC concentrates on wastes reduction in construction processes; b) LC seeks to minimize irregularity and variability so that there will be flow of material and information in processes without any interruptions; and c) LC uses pull system: materials for construction is expected to be delivered on site just when it is required or needed (Rahman et al., 2012; Aziz & Hafez, 2013).

2.5.2 Lean Construction

The past two decades has witnessed several performance improvements accomplishment in the manufacturing industry through productivity increase. A central point in this accomplishment is the application of the concept of production philosophy, known as 'Lean Production', which focuses on continuous improvements in processes through the elimination of different types of wastes or delays. In the 1940s, a newly adopted concept emerged as Lauri Koskela argued for a paradigm shift to a more robust system through the development and adoption of production philosophies and approaches in the construction industry (Koskela, 2013). However, it only became prominent in the mid-1990s and since that time, lean construction has emerged as a new concept, both in construction management and practical sphere of construction. There are two somewhat contrasting explanations of LC. One explanation is about the adoption of the lean production methods and tools to construction. Interestingly, the other explanation sees lean production as a theoretical motivation for the theory based approach for construction, thus, LC (Koskela et al., 2013). Even so, Rahman et al. (2012) opined that there are four roots of this LC approach: i) Accomplishment of the Toyota Production System; ii) Unsatisfactory performance of projects; iii) Efforts to establish project management on a theoretical foundation; and iv) Discovery of facts anomalous (difficult to clarify) from the perspective of conventional thinking and practice.

LC is a concept that involves the application of lean manufacturing principles or lean thinking into the construction industry. The concepts as echoed by Koskela (2013), and Gonzalez et al. (2013) will lead to improved delivery systems and processes through the elimination of delays in the construction industry, thus, improve project and financial performance of the industry. That is, LC is aimed at reducing delays, increasing productivity and health and safety in fulfilling the client's requirements.

Regardless of the fact that construction operations and supply chains are different to those applied in manufacturing, the principles of lean are equally applicable (Aziz & Hafez, 2013). It should, however, be noted that lean is as much a philosophy and culture as a set of principles or methodologies and therefore could be applied to any industry (Anvari et al., 2014). That is, lean manufacturing techniques can be applied not only in manufacturing but also service oriented and other environment (Salimi et al., 2012). This is because every system has some levels of delays and whether one is providing a service, processing a material, producing a product or constructing a project, there are some levels of components which are considered as a delay. Therefore, the methods for assessing systems, recognizing and removing delays and concentrating on the requirements of the client are relevant in any system, as well as in any industry. LC shares same objectives as lean production; elimination of delays, reduction of cycle time, continuous improvements, reduction of variability, continuous flow, pull production control, competitive advantage, among others (Salimi et al., 2012; Aziz & Hafez, 2013). The concept of lean rest on five (5) principal principles that when followed will reduce delays and maximize profit (Aziz & Hafez, 2013). These principles are:

(i) Value Specification: Precisely specify what creates value from the client's perspective;

(ii) Value Stream Identification: Clearly identify all the steps in the processes (value stream) that deliver exactly what the customer values and remove everything that does not add value to the customer;

(iii) Flow: Take actions that ensure continuous flow in the value stream;

(iv) Pull: This means to produce only what the customer wants just in time; and

(v) Perfection: Always strive for perfection by delivering what the customer wants and expects through a continuous removal of waste.

The tenets of lean manufacturing have the potential to make companies produce at a less cost through the removal of delays from the value stream (Muhammad et al., 2013). As a result, several industries including the construction industry have turned on lean manufacturing production philosophies (process improvement) to deal with the challenges in their businesses, thus, lean application for construction delays in Malaysia. The potential effect of lean manufacturing philosophy on the effectiveness of construction industry is very much recorded (Rahman et al., 2012).

2.5.3 Wastes in Construction

Lean has to do with designing, operating in continuous process flow or working with the right process and having it right the first time (Aziz and Hafez, 2013). Waste mostly used in construction projects as a delay is seen as activities and processes that consume resources yet do not add value, thus, any non-value added activity or process is considered as waste. Waste involves anything that adds no value from the clients' perspective (Aziz & Hafez, 2013). The essential focus of lean is to provide a product that the client truly need through identification and removal of delays in processes in a step-by-step approach. In other words, the focus of lean is more on value than cost, which seeks to improve value added activities whilst eliminating non-value added ones. Two kinds of activities were recognized by Taiichi Ohno: i) Value-Adding Activities, and ii) NonValue-Adding Activities. The latter are essentially delays and ought to be removed from processes. However, Rahman et al. (2012) further observed three classifications of production activities and these include: a) Non-Value Adding Activities, which are considered pure wastes and unnecessary activities which ought to be totally eliminated; b) Necessary but Non-Value Adding Activities, which involve operations that may be considered as waste yet are essential within the operating procedures. In order to eliminate them, some changes are required to enhance the standard operating procedures; and c) Value Adding Activities which include the change or transforming of raw materials or semi-finished products to finished products.

Recently, wastes in construction have been a subject of interest for many researchers across the globe. Nonetheless, the focus has been on material waste, which tends to be one among the resources in the construction process. This study, however, does not focus only on on-site material waste but most importantly wastes on several activities including; overproduction, lead time, transportation, inappropriate processing, inventories, unnecessary movements, rework, making do and design. Koskela et al. (2013) described waste as undesirable, money, time and other resources consuming activities which add no value to a product. For the most part, the idea of waste is specifically connected with the use of resources that add no value to the finished product. This is all that much not quite the same as the construction professionals' perspective of waste, where waste is alluded to be a material waste and there have not been any significant effort to separate activities of construction into value adding and non-value adding activities (Rahman et al., 2012).

Waste is characterized into seven (7) types by Ohno (1988): Overproduction; Time on hand (waiting); Transportation; Additional/Inappropriate Processing; Inventories; Movement; and Making Defective Products. Waste in manufacturing and construction involves excesses in inventory, time overruns, the cost of quality, the absence of safety, rework, unnecessary transportation, queue time, long distances, setup, handling, movements, inspections, expediting, poor decision or management strategies, requirements, among others. Also, according to Koskela et al. (2013), waste can be differentiated between operational and process wastes. Movement and waiting can be associated with machines or people, which are moving unnecessarily or being idle, and these are considered to be operational wastes. The other five (overproduction, transportation, additional processing, inventories and making defective products) are process waste. The seven types of waste can be explained as follows (Rahman et al., 2012):

(i) Overproduction is identified with producing more than required or producing earlier than should be expected. This regularly results in quantity and quality issues; an organization realizes that it will lose various units along the process of production so delivers additional to verify that the client request is fulfilled. This may result in misuse of materials, worker hours or usage of equipment. Overproduction issue can be handled by utilizing mistake-proofing approach (Pokayoke) and by understanding the equipment process capacities of the production machines.

(ii) Waiting is identified with idleness that is mostly caused by poor synchronization and material flow leveling, and pace of work by distinctive equipment or groups. Also, waiting occurs at whatever point products are not being processed or moving. The idleness is perhaps created during waiting for engineering, maintenance, raw materials, designing, quality assurance results, inspections, confirmation order, and so forth. Waste generated through waiting can be reduced drastically by connecting the processes together and sustaining the flow of the processes.

(iii) Transportation (Material/Equipment Movement) has to do with the moving of materials or equipment within the site where poor working environment layout or an absence of process flow makes numerous stops and starts in the cycle of production. The working environment of a construction site can fundamentally be the major reason contributing to unnecessary transportation. Also, extreme handling, utilization of inadequate equipment or bad states of pathways can likewise precipitate this type of waste. It is worth noting that, every movement ought to have a reason since things being moved incur some kind of cost. Work process flow interruptions can significantly add to the costs of transportation. These wastes include; waste of worker's hours, waste of space on site, waste of energy, and the likelihood of waste of material during transportation. Proper re-laying out of the machines within an industrial facility from a functional to a cellular layout has been demonstrated to not just help reduce waste generated by transportation but as well reduce Work in Progress (WIP) and Waiting. Likewise, this can be applied to the construction industry where an appropriate plan for site layout would be able to minimize unnecessary material movement.

(iv) Processing (Excessive Processing/Over-Processing) occurs in situations where processing or conversion activity does not add value to the product or service from the client's perspective. This is constantly created by the quality issue of the work done. The most evident example of over-processing is rework relating to surface finishes or works. Tools such as Statistical Process Control (SPC), 5 whys, Pokayoke (Mistake Proofing), among others, can be used to help identify and remove the causes of this waste. This waste can also be avoided by changing the technology used for construction.

(v) Inventory (Stock/Storage Waste) is identified with unnecessary or excessive inventories which prompt material waste (material losses because of insufficient stock conditions at site, robbery, deterioration, vandalism), and fiscal losses because of the capital being tied up. Excessive inventory is seen as waste since there is no value activity in stocking inventory. Moreover, inventory occupies space, adversely affects capital, and incurs costs, among others. Sometimes organizations arrange more than needed to satisfy a request. The problems associated with inventory may be due to quality problems with the production processes and may likewise be as a result of inadequate resource planning or uncertainty on the quantity estimations.

(vi) Movement (Motion) is identified with ergonomics and is seen in all instances involving stretching, bending, lifting, strolling and reaching. The waste generated by motion is concerned with the unproductive or unnecessary movements made by employees during work hours. This waste may be caused by poor work methods, lack of equipment, or poor work area arrangement. Also, long distances which must be covered within a work site to perform or accomplish assignments is also considered a waste of time and effort. Unnecessary movements may create or increase the level of injuries, accidents, and their related costs. Lean thinking seeks to minimize poor housekeeping, poor work area organization, poor layout of machinery, and poor or inconsistent work methods. Hence, when there is a proper work area layout, unnecessary or unproductive motion of workers would be minimized, and this would lead to costs saving. Therefore, jobs or occupations involving unnecessary movements ought to be examined and redesigned to minimize motion and its associated costs.

(vii) Making Defective Products (Rejects/Unacceptable/Unnecessary Work) happen when the finished or half-processed products are not up to the quality requirements. This is the common waste in the construction industry where segments or products made are not up to specifications. Defects may prompt rework or the use of poor or unnecessary materials to the building; for instance, the extreme thickness of plastering works. The cost of product considered as defective is the same as it does to deliver a prize product. Other than the losses, there are numerous different costs connected with rejects that make this an especially imperative classification of waste to minimize or eliminate. Defects can happen through an extensive variety of reasons, for example, poor specification and design, inadequate planning and control, inadequate qualification of the project/work team, poor integration of design and production, just to mention a few. New methods to handle defects must be used and checked.

For instance, six sigma can be used for improving quality through identification and removal of defects and reduction of variability in processes. Six Sigma is able to achieve process quality of 99.99966% that are free from defects (Alireza & Sorooshian, 2014; Koay & Sorooshian, 2013).

In addition to Ohno's seven types of wastes, various analysts have presented the eighth and other wastes. For instance, Macomber & Howell (2004) identified several wastes which can extensively be classified as inability to utilize individuals' abilities, skills and capacities; behavioral waste; information waste; and a waste of good ideas. Also, Womack & Jones (2003) have included the eighth waste, which is the design of goods and services which do not satisfy the needs of the end user. More also, Burton & Boeder (2003) have included waste of human potential as the eighth type of waste. Waste of human potential is identified with the failure in full usage of individuals' skills. Besides, one of these wastes mostly observed in construction is the making-do. According to Koskela et al. (2013), making-do waste is related to a circumstance where a task is begun without all its standard inputs or a task is proceeded before all preconditions or requirements or data are ready.

However, Ohno's seven types of wastes will be considered for this study as other wastes classification according to Rahman et al. (2012) can almost often be incorporated in one of the seven types, or they are a cause of the waste instead of a waste itself. Case in point, human potential waste is more a cause of other waste types such as waste of defects or processing waste that is generated because of inadequate skills of individuals (Rahman et al., 2012).

2.5.4 Why Lean Construction

Since construction industry plays a major role in every national economy and many other industries depend on it in terms of purchasing inputs and also providing products to almost every other industry; reducing or removing delays in the industry would lead to great cost savings for the industry as well as the economy. The following among others have been highlighted to strengthen the importance of lean construction and reasons why its application is necessary for the construction industry.

(i) It must be emphasized that value is what the client is really paying for the project to deliver and install. LC is an approach to design the system of production to reduce waste of time, materials, and effort with a specific end goal to generate the most conceivable amount of value (Koskela et al., 2002; Muhammad et al., 2013).

(ii) Again, designing the system of production to attain the stated ends is only achievable through the joint effort of all project participants namely client, architect/engineer, facility managers, end users, among others, at early phases of the project. This goes beyond the contractual agreement of design or build or constructability assessment where contractors, and at times facility managers merely respond to designs as opposed to involving and influencing the designs (Abdelhamid et al., 2008). LC makes this possible by integrating and engaging the effort of all the project participants. LC seeks to maximize client's satisfaction through concurrent engineering (or design) which integrate various tasks executed parallelly by multi-disciplinary teams with the aim of optimizing engineering cycles of products for efficiency, quality, and functionality (Aziz & Hafez, 2013).

(iii) Also, LC basically seeks to encapsulate the benefits of the concept of Master Builder. LC acknowledges the fact that desired ends influence the means to accomplish these ends, and that available means will influence realized ends (Abdelhamid et al., 2008).

(iv) In order to ensure reliable and predictable production system flow on the project site, there should be a strong alignment of the whole supply chain in such a way that waste is reduced and value maximized. With such a wide scope, lean production or manufacturing tools and techniques have been most influential and exceptionally effective in dealing with wastes in supply chain delivery systems.

This section was able to establish the fact that the employed or existing project management models and strategies have not been able to deliver projects on time and as a result has created delays usually seen as wastes from lean construction perspective in the construction industry through a comprehensive literature survey. The section also discussed LC, its principles, and wastes or delays in the industry. The study demonstrated that LC presents a new and robust approach to dealing with the wastes in the construction industry. This was illustrated with some highlights of the importance of LC application (Why LC). Finally, it was established that the application of lean tools by project teams and industry's practitioners will minimize or eliminate delays, enhance performance and lead to great cost savings for the industry as well as the economy.

2.5.5 Lean Tools

There is no dought that lean construction is the way forward for construction industries around the world, especially Malaysia. However, it is imperative to establish the level of weight of the lean tools used in the construction industry. For most companies, there are still some uncertain and unresolved issues concerning the lean application and its suitability. According to Li (2011), proper prioritization and the choice of appropriate lean tool(s) is crucial for the failure or success of any organization. Also, most of the existing body of knowledge on lean construction tools application are country or project specific, concentrated on lean application and barriers to lean implementation, lean principles or lean thinking (Sacks et al., 2010; Lajevardi et al., 2011; Marhani et al., 2013; Sarhan & Fox 2013; Muhammad et al., 2013; Nikakhtar, et al., 2015) or description of a single, two or few lean tools; thereby overlooking other suitable lean tools, whilst others are consultancy approaches which are partially and in some cases not published. Thus, the need for more empirical research that focuses on prioritization and suitability of lean tools in construction projects in Malaysia. Although, it is an undeniable fact that the adoption of the lean tool in construction projects is very significant for delay control (Salimi et al., 2012; Rahman et al., 2012; Marhani et al., 2013; Sarhan & Fox 2013; Aziz & Hafez, 2013; Nikakhtar, et al., 2015), but without a clear identification and prioritization, reducing delays in the construction industry will be complicated.

The stimulating point here is concerned with applicability and suitability or categorization of the lean tools. Categorizing lean tools based on their effectiveness in controlling delays is crucial for empowering project teams to deploy practical tools to eliminate the delay sources and the effects resulting from delays. The improvement and performance of the lean project development program cannot be achieved and this may lead to poor decision making in the lean implementation roadmap. For this reason, this study has highlighted some lean tools from the literature review (journals, books, articles, companies websites, etc.) for the consideration by experts to further select appropriate tools for examination of the level of their weights and suitability for controlling delays in construction projects.

Emphatically, among the improvement approaches, which is trending in recent years within the construction industry, is the use of Off-site fabrication (OSF), or Off-site manufacturing (OSM), Industrialised Building Systems (IBS), Prefabrication, Computer Integrated Manufacturing (CIM), Building Information Modeling (BIM), Business Process Re-engineering (BPR), Business Process Modeling (BPM), Total Quality Management (TQM), Lean and Six Sigma, among others (Rahman et al., 2012; Ang & Kasim, 2013; Koay & Sorooshian, 2013; Anvari & Sorooshian, 2014; Andújar-Montoya et al., 2015). The choice for a specific process improvement technique will depend on a particular circumstance (Anvari & Sorooshian, 2014) and the existing needs of the workplace, including improvement objectives, knowledge, skills, type of processes and the available resources (Schweikhart & Dembe, 2009). For instance, Six Sigma might be more suited for analyzing defects and reducing process variability (Anvari & Sorooshian, 2014), BPM and WM may be appropriate for product flow and layout planning, and Lean for optimizing and streamlining process steps transitions (Schweikhart & Dembe, 2009). This study concentrates on LMT due to its applicability in construction projects as suggested by several literature (Rahman et al., 2012; Lajevardi et al., 2011; Marhani et al., 2013; Sarhan & Fox 2013; Muhammad et al., 2013; Nikakhtar, et al., 2015). The succeeding section highlights about 40 suitable tools that were considered for the purpose of this study

Table 2.1 *Lean Tools*

No.	Reference	Tools	Description
1	Alireza & Sorooshian (2014), Rahman et al. (2012), Muhammad et al. (2013)	5S	Stands for Seiri, Seiso, seiton, Seiketsu and Shitsuke, (meaning Sort, Straighten, Shine, Standardize, and Sustain). This is a process for waste removal from the workplace through the use of visual controls.
2	Aziz & Hafez (2013), Rahman et al. (2012)	Concurrent Engineering	This methodology involves the various tasks parallelly executed multi-disciplinary teams with the aim of optimizing engineering cycles of products for efficiency, quality, and functionality.
2	ASQ (2015), Rahman et al. (2012)	Check Sheet	Also known as Defect Concentration Diagram. This is a structured form prepared for collecting and analyzing data. It is a generic tool adapted for a variety of purposes including observation and a collection of data on the frequency of patterns of problems, events, defects, causes, etc.
4	Lee et al. (1999), Rahman et al. (2012)	Construction Process Analysis	This actualizes process charts and top-view flow charts common among process analysis methods. These diagrams and charts depend on standardized symbols and effectively describe process flow and enable a quick determination of areas where problems exist in the process. The charts comprise of six symbols; Operation, Storage, Transportation, Volume InspectionDelay, and Quality Inspection. The process diagram records every progression or step of a construction operation. Furthermore, it records flow within units, sections, and departments
5	Alireza & Sorooshian (2014), Rahman et al. (2012)	Six Sigma	Sets of tools and techniques for improving quality through identification and removal of defects and reduction of variability in processes. Six Sigma is able to achieve process quality of 99.99966% that is free from defects.
6	ASQ (2015), Rahman et al. (2012)	Pareto Analysis	This is a bar graph that is used for analyzing data about the frequency of the causes or problems in processes. It visually depicts which situation are more important.
7	Alireza & Sorooshian (2014), Rahman et al. (2012)	Check Points and Control Points	These are mechanisms used to regulate and determine the levels of improvement in the activities of managers occupying different levels of positions

8	ASQ (2015), Rahman et al. (2012)	Failure Mode and Effects Analysis (FMEA)	This is a step by step approach for identifying potential failures in product or service, design, and manufacturing, etc. The failures are further ranked to determine the seriousness of their consequences in order to take actions to eliminate them, starting with the highest ranked ones.
9	Aziz & Hafez, (2013), Alireza & Sorooshian (2014)	Continuous Flow	This means to constantly provide or process and produce through a progressive system of uninterrupted steps in the process.
10	Alireza & Sorooshian (2014)	FIFO line (First In, First Out)	This is an approach for handling work request in order of flow from first to the last.
11	Alireza & Sorooshian (2014)	Jidoka/Automation	The purpose of Jidoka is to design machines to partially automate the manufacturing process and operations in order to separate people from machines so that operators carry out other task(s) while the machines are running.
12	Rahman et al. (2012), Alireza & Sorooshian (2014)	Kanban (Pull System)	This is a Japanese word which literally means "billboard or signboard". It is an information control process which regulates the movements or flow of resources so that parts and supplies are ordered and released as they are needed.
13	Alireza & Sorooshian (2014)	Kaizen	This is Japanese business philosophy of continuous improvement. This is an approach that seeks to improve quality and efficiency through the elimination of waste from the value stream.
14	Rahman et al. (2012), Muhammad et al. (2013), Aziz & Hafez (2013)	The Last Planner	The last planner is a person or group of people with the task to control production unit. They are responsible necessitating control of workflow, verify supply stream, design, and installation in all the production units.
15	Alireza & Sorooshian (2014)	Heijunka (Level Scheduling)	This is an evenly spreading of production for customer orders by looking at the average demand and combining them into a production schedule that takes into consideration the volume and mix.
16	Muhammad et al. (2013), Alireza & Sorooshian (2014)	Poka-Yoke (Error Proofing)	This is a mechanism design to detect and prevent errors in processes with the aim of achieving zero defects.
17	Salem et al. (2005), Rahman et al. (2012), Muhammad et al. (2013)	First Run Studies	Trial execution of a process with a specific end goal to decide the best means, strategies, sequencing, among others to perform it. First run studies are done a couple of weeks ahead of the scheduled execution of the process, in order to

			secure some time to acquire diverse or extra essentials and resources. In construction, this is used for redesigning critical assignments. This is part of continuous improvement effort, and incorporate efficiency studies and review work techniques by redesigning and streamlining the distinctive functions involved. The techniques involve the use of photographs, video files or graphics to demonstrate the process.
18	Alireza & Sorooshian (2014)	Time and Motion Study	A procedure for evaluating industrial or other operational efficiency on the basis of the taken or needed time for an operation or production.
19	Rahman et al. (2012)	Bottleneck Analysis	This is the identification of the part of the process that put a limitation on the overall productivity in order to improve the performance of that part.
20	Alireza & Sorooshian (2014)	Total Productive Maintenance (TPM)	This is a holistic maintenance approach for equipment in order to maximize the operational time of the equipment.
21	Rahman et al. (2012), Muhammad et al. (2013), Alireza & Sorooshian (2014)	Visual Management	This is information communication technique employ to increase efficiency and clarity in processes through the use of visual signals.
22	Alireza & Sorooshian (2014)	Synchronize/Line Balancing	This involves leveling of workload across all processes in a value stream to remove excess capacity and bottlenecks.
23	Tsao et al. (2004), Rahman et al. (2012)	Work Structuring	This is used for the development of process design and operation in alignment with the supply chain structure, allocation of resources, product design, and assembly design efforts with the objective of making work process more reliable and quick while delivering quality to the client.
24	Alireza & Sorooshian (2014)	Multi-Process Handling	This involves assigning operators tasks in multiple processes in an oriented layout of a product flow.
25	Tsao et al. (2004), Muhammad et al. (2013)	5 Whys	This is a quality management tool for problem-solving and it tries to find the root cause of an issue. It stipulates that workers should be asking why five times repeatedly until they identify the underlying root or the nature of the issue and its solution becomes clear. The procedure tries to fix a system by eliminating the root cause to avoid its recurrence

26	Salem et al. (2005)	Fail Safe for Quality	This relies on the generation of ideas which alert for potential defects. This is almost the same as Poka-Yoke techniques but it can be extended to safety. However, the concentration in safety is on potential hazards rather than potential defects, and it is identified with the risk assessment technique. It requires action plan that avoids bad outcomes
27	Salem et al. (2005), Muhammad et al. (2013)	Daily Huddle Meetings	This a technique used for communicating and for everyday meeting process of the project team in order to accomplish workers involvement. With project awareness and problem-solving contribution alongside some training that is given by different tools, the satisfaction of job (sense of growth, self-esteem,) will increase.
28	Alireza & Sorooshian (2014)	Preventive Maintenance	This is regular maintenance performed on equipment to reduce the probability of its failure. It is usually performed while the equipment is working to avoid unexpected breakdown.
29	Alireza & Sorooshian (2014)	Quality Function Development (QFD)	This refers the use of customer's voice and different organization functions and units for final engineering specification of a product.
30	Leanproduction.Com (2015)	SMART Goals	Goals that are Specific, Measurable, Attainable, Relevant, and Time-Specific.
31	Leanproduction.Com (2015)	PDCA (Plan, Do, Check, Act)	This is an iterative approach for improvements implementation. It involves; Plan (set up a plan and expect results); Do (execute the plan); Check (verify anticipated result achieved); and Act (evaluate; do it again).
32	Alireza & Sorooshian (2014)	Setup Reduction	This is a changeover technique use to speedily change tools and fixtures in order for multiple products to be run on the same machine.
33	Muhammad et al. (2013), Alireza & Sorooshian (2014)	Work Standardization	Manufacturing documented procedures that capture best practices. This "living" documentation that is easy to change.
34	Alireza & Sorooshian (2014)	Statistical Process Control	This is a quality control tool that monitors and control process in order to ensure that system output variables operate to its full potential through periodic measurement.
35	Alireza &Sorooshian (2014)	Suggestion schemes	This is a formal mechanism which allows and encourages employees to actively contribute productive ideas for product and process improvements.

36	Rahman et al. (2012), Muhammad et al. (2013), Aziz & Hafez (2013)	Just-in-Time (JIT)	This is a technique aimed primarily at minimizing flow times within a production as well as response times from suppliers and to end users. In any case, JIT is a way of thinking, working and managing to eliminate wastes in processes.
37	Alireza & Sorooshian (2014)	Team Preparation	This is a process of conducting training on waste, continuous flow and standardizes work for the lean team or employees.
38	Rahman et al. (2012), ASQ (2015)	Muda Walk	Muda is a Japanese word meaning waste. Muda walk is a technique used to identify waste through observation of operations, how work processes are conducted, and noting areas where improvements are needed.
39	Rahman et al. (2012)	Value Stream Mapping	A technique for visually analyzing, documenting and improving the flow of a process in a way that highlights improvement opportunities.
40	Leanproduction.Com (2015)	Root Cause Analysis	This is a problem-solving technique that focuses on discovering and resolving the real problem instead of quick fix application that only solve problem symptoms.

These tools are mostly common in construction industry around the world and according to Nikakhtar et al. (2015), most tools are an effective approach for minimizing delays in Malaysian construction industry is through lean tools application. Even though Malaysian construction industry is still evolving, there has been neglect of important benefits of lean tools application in the industry (Muhammad et al., 2013). Meanwhile, other industries are reaping the benefits of lean tools adoption (Salimi et al., 2012; Koay & Sorooshian, 2013; Anvari et al., 2014; Alireza & Sorooshian, 2014). Similarly, other construction industries elsewhere have found lean tools to be effective in delay control (Marhani et al., 2013; Sarhan & Fox 2013; Aziz & Hafez, 2013).

2.6 Chapter Summary

The review analysis concentrated on two main sections: sources of delays and lean management tools. From the review, it was observed that the delay sources in construction projects can be internal or external. These delay sources were evaluated and discussed through two main frameworks namely 4Ps and PESTLE. The result of the findings indicated that these delay sources and the associated effects on construction projects are a global phenomenon; however, the level of the magnitude may be unique to a particular project and geographical boundary. It is therefore advised that a routine industrial scan should be undertaken by project teams, industrial practitioners, and governments, to understand the dynamisms, complexities and the challenges posed by the delay sources. Likewise, it was established that the existing project management models and strategies have not been able to deliver projects on time and as a result have created wastes in the construction industry through a comprehensive literature survey. The study demonstrated that LC presents a new and robust approach to dealing with the delays in the construction industry. This was illustrated with some highlights of the importance of LC application (Why LC). Finally, it was concluded that the application of lean tools by project teams and industry's practitioners will minimize or eliminate the delays, enhance performance and lead to great cost savings for the industry as well as the economy.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter provides a detailed description and justification of the research methodology for this thesis. It discusses the structure including the fundamental stages, individual steps and sequential processes of the method for executing the objectives of this study. Also, qualitative research approach (through literature review), quantitative research approach (multi-criteria decision making), data collection and methods, and goodness of results are discussed. The chapter begins with research framework, a brief description of the stages of methodology; delay sources and lean tools identification; groupings of delays sources; data collection; multi-criteria decision making (MCDM); goodness of results; validity of data collection tool; reliability data; consistency of results; and external validity of findings.

3.2 Stages of Research

There are FOUR main stages considered in the structure of the research methodology. The first stage considered Qualitative Research Approach, which involves delay sources and lean tools identification through literature review to establish further understanding on the main sources of delays and the suitable lean tools. This stage also grouped delays sources based on their shared characteristics. Also, the second stage concentrated on Quantitative Research Approach through multi-criteria decision making (MCDM) technique for interview guideline design and ranking the level of effects of the lean tools on the delay sources. More also, the third stage focused on data collection and methods. Interview with experts was conducted to solicit opinions on the chosen variables in this research. This stage also involves data analysis. Lastly, the fourth stage comprised the goodness of the results. Figure 3.1 illustrates the flow chart of this study, with the stages clearly indicated in the chart.

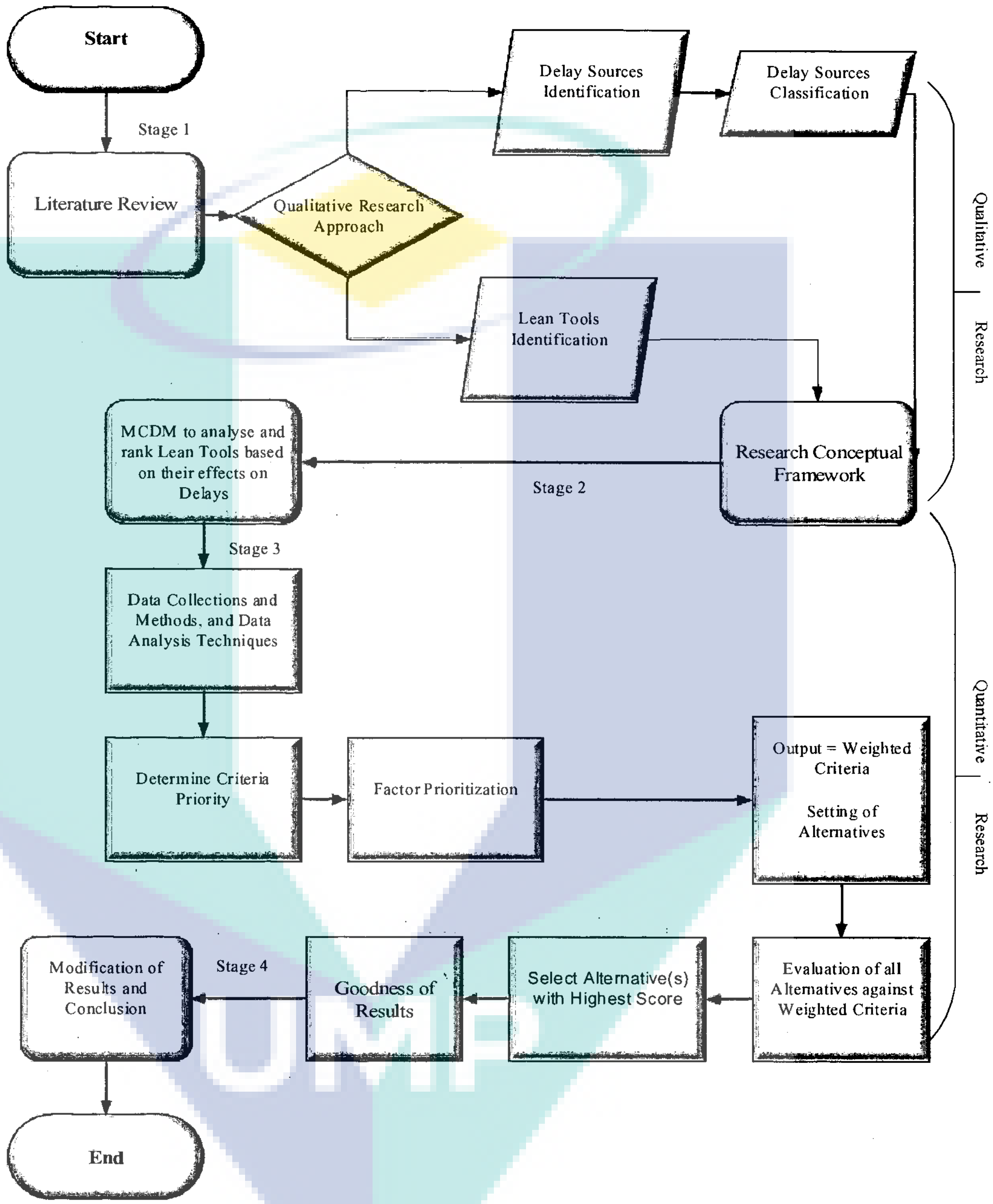

Figure 3.1 Research Flow Chart

3.3 Stage 1: Qualitative Research Approach

The step of identifying and defining delay sources and lean tools, and developing a conceptual framework of this research was explained in chapter 2. The objectives 1 and 2 of this research were derived from existing literature; existing project delay sources and lean tools in literature were reviewed. The results of the literature review indicated that the domain in this study consists of two main sources, namely; internal and external sources. The internal sources identified four main variables including; Project Scope related factors; Procurement related factors; Project Management factors; and Project Participants related factors; known as the "4Ps Framework" (Figure 2.1). Also, the external sources identified six main variables namely; Political; Economic; Social; Technology; Legal; and Environment; known as "PESTLE Framework" (Figure 2.2). More also, through the review of existing literature content and preliminary analysis, forty suitable Lean Management Tools were identified and further discussed.

3.4 Stage 2: Quantitative Research Approach

Decision-making techniques range from dependence on chance (for example; flipping a coin) to the utilization of more organized tools. However, sound decision making involves the utilization of knowledge, insight, and innovativeness and takes account of measuring all the significant factors. In the presence of inherently perplexing multi-criteria decision problems, making the right decision requires an evaluation of numerous factors that must be weighed against contending priorities (Alam et al., 2012). It is quite remarkable that the utilization of statistics and probabilities for conventional correlation analysis has been considered inadequate in handling uncertainties associated with failures in data and modeling (Alam et al., 2012; Robinson & Amirtharaj, 2014). This research basically employed quantitative approach, which comprised of multi-criteria decision-making methodology to rank lean tools on the identified delay sources to establish their effects. The delays and lean tools constituted the criteria and alternatives respectively.

Multi-Criteria Decision Making (MCDM) is a branch of decision-making approach that usually deals with multiple, complicated and conflicting criteria. It involves a general class of operations research models which considers problems in the presences of many decision criteria. MCDM is further classified into two main operations research models and these are; Multi-Objective Decision Making (MODM) and Multi Attribute Decision Making (MADM) (Aziz et al., 2015). There are several methods in each category and each method has its own characteristics. The MADM will be considered for the purpose of this study.

Multi Attribute Decision Making (MADM) method has been taken as the base for decision-making model and is one of the decision-making support methods. This method is based on the list of criteria chosen, its parameters, and variables which one wishes to monitor in decision-making process. The MADM has other several classifications including; Dematel; SAW; Vikor; Topsis; among others; but the Analytic Hierarchy Process (AHP) is used for model development, data collection and methods, and data analysis techniques. The reason for choosing this method is because AHP is able to solicit consistent subjective experts' judgment through the consistency test. Also, AHP is regarded as being popular because of its wide use (Zamani & Yousefi, 2013; Aziz et al., 2015).

3.4.1 Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) has been practical and useful Multi-Criteria Decision Making (MCDM) tool which provides the foundation for making evaluations in complex decision making. AHP problems techniques have been seen to be far reaching in real life decision-making circumstances and focus on the discovery of desirable solution from a limited number of feasible alternatives evaluated on multiple properties (Criteria), both quantitative and subjective (Cabola, 2010). In this study, MCDM-AHP framework methodology is used for model development, data collection and methods, and analysis techniques.

AHP was developed in the 1970s by Saaty (1980) and this method is applied in group decision making widely used around the world in a variety of fields such as business, government, industry, education, health, and others. The method allows some small inconsistency in judgment because human beings are not always consistent (Alam et al., 2012). The scales of ratio and consistency index are derived from the principal Eigenvectors and Eigenvalues respectively. The method focuses on prioritizing the selection criteria and distinguishing the most important criteria from the less important ones. It also allows for both qualitative and quantitative approaches to solving decision problems (Alam et al., 2012; Tayfun & Uyan, 2013; Aziz et al., 2015). Model development, data collection methods, and data analysis techniques are discussed below using AHP.

3.4.1.1 Model Development

AHP conceptual development model has three stages. The first stage has to do with research goals, the second contains criteria and/or sub-criteria for pairwise comparison and the last stage consists of the alternatives (Alam et al., 2012). For the purpose of this research and empirical analysis, there are two conceptual models, namely, internal source of delays (4Ps) and an external source of delays (PESTLE). Also, their corresponding lean tools is analyzed separately as each of the sources has its own unique characteristics. The diagrams in Figure 3.2 and Figure 3.3 below illustrate the models.

AHP Conceptual Model 1

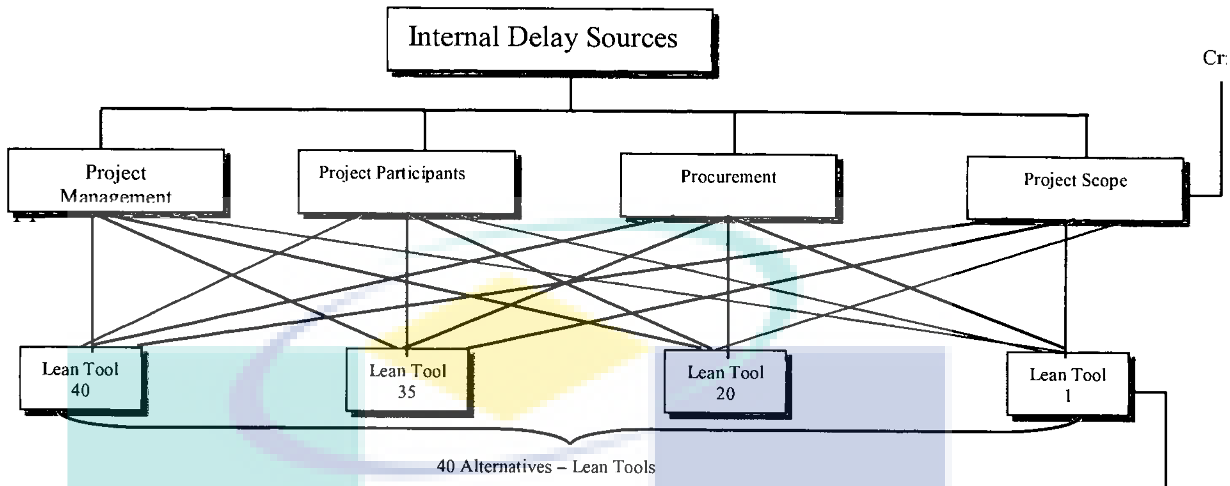

Figure 3.2 Conceptual Model 1

AHP Conceptual Model 2

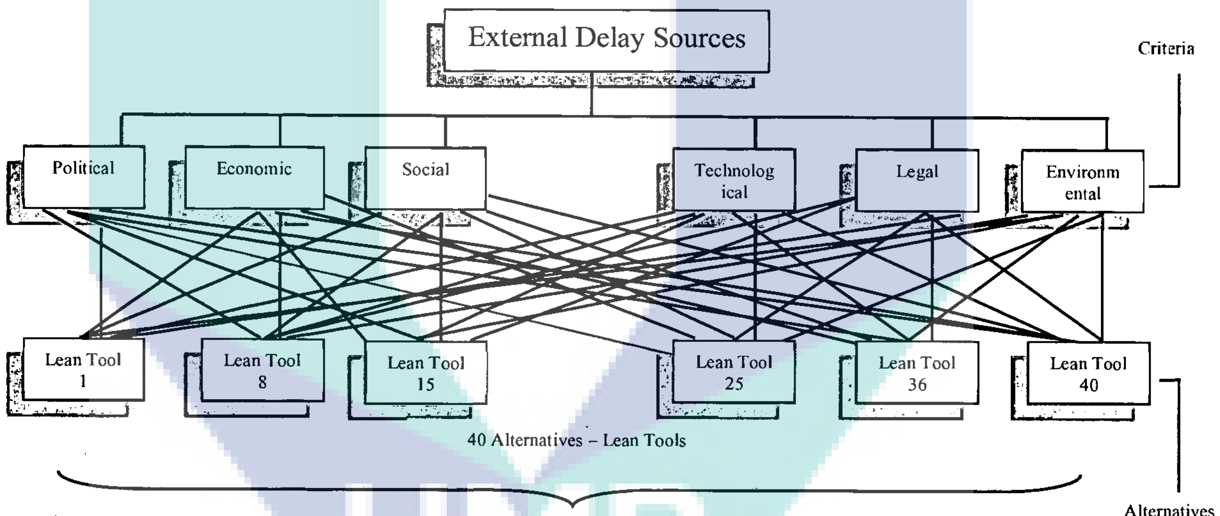

Figure 3.3 Conceptual Model 2

For data analysis techniques, the conceptual models are analyzed separately under separate model for each of the delay sources respectively. That is, the internal delay sources are analyzed separately under one model while the external delay sources under another model using the same data analysis tools and techniques as explained in the figures above.

3.4.1.2 Data Analysis Techniques

Alam et al. (2012) demonstrated that there are some steps of calculation that should be used in a data analysis and these are hierarchy construction; construction of pair-wise comparison matrices; weights determination; and synthesis of weights.

(i) STEP I: Hierarchy construction where objective are highlighted and criteria and alternatives identified. The objective for using AHP is to rank the identified lean tools (Alternatives) on delay sources (Criteria).

(ii) STEP II: Construction of pair-wise comparison matrices for all the criteria and alternatives. This pair-wise Comparison is adopted from the studies of Tayfun & Uyan (2013). The matrix is represented mathematically Eq. (3.1).

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \qquad 3.1$$

Where A = a_{ij}, $a_{ij} > 0$ and $\frac{1}{a_{ji}} = a_{ij}$

If "n" number(s) are given for pair-wise comparison, then AHP performs the above process to determine the weights of criteria. A = n x n, where "A" represent the alternatives and a_{11} - a_{1n} , and others represent the pair-wise comparison(s). A scale of 1-9 is used for comparison in order to know the degree of importance (Ahmad & Pirzada, 2014). This is shown in Table 3.1 below.

Table 3.1 AHP Opinion/Decision Scaling

Preference Scale	1	3	5	7	9	2, 4, 6, 8
Explanation	Equal Significance	Moderate Significance	Strong Significance	Very Strong Significance	Extreme Significance	Intermediary Values between the two adjacent judgments

(iii) STEP III: Determine the weight of the criteria and the local weight through normalization procedure: The weights of the criteria and local weight of the alternatives are determined from the matrices in STEP II by dividing each value in a column 'j' by the total of the values in a column 'j'. The total of the columns in the matrix must be 1, hence, a normalization of the pair-wise comparison matrix as expressed in Eq. (3.2) (Tayfun & Uyan, 2013).

$$Aw = \begin{bmatrix} \frac{a_{11}}{\sum a_{i1}} & \frac{a_{12}}{\sum a_{i2}} & \cdots & \frac{a_{1n}}{\sum a_{in}} \\ \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots \\ \frac{a_{n1}}{\sum a_{i1}} & \frac{a_{n2}}{\sum a_{i2}} & \cdots & \frac{a_{nn}}{\sum a_{in}} \end{bmatrix} \quad 3.2$$

(iv) STEP IV: Obtain global weights of the alternatives through the synthesis of the local weights. Firstly, the eigenvector of matrix A is determined by calculating C_i as the average and then the C_i as the average values in the row 'i' of Aw matrix is calculated for the column vector C where C_i value indicates the relative degree of importance as illustrated below in Eq. (3.3) (Tayfun & Uyan, 2013).

$$C = \begin{bmatrix} C_1 \\ C_2 \\ \vdots \\ C_n \end{bmatrix} = \begin{bmatrix} \frac{\frac{a_{11}}{\sum a_{i1}}}{n} + \frac{\frac{a_{n2}}{\sum a_{i2}}}{n} + \cdots + \frac{\frac{a_{1n}}{\sum a_{in}}}{n} \\ \cdots \quad \cdots \quad \cdots \quad \cdots \\ \cdots \quad \cdots \quad \cdots \quad \cdots \\ \cdots \quad \cdots \quad \cdots \quad \cdots \\ \frac{\frac{a_{11}}{\sum a_{i1}}}{n} + \frac{\frac{a_{n2}}{\sum a_{i2}}}{n} + \cdots + \frac{\frac{a_{nn}}{\sum a_{in}}}{n} \end{bmatrix} \quad 3.3$$

In order to aid the assessment and calculation of the findings, all the computations would be generated through Microsoft Excel (Version 2013) to examine the study's proposed models. Microsoft Excel is able to reduce a complex decision to a series of pair-wise comparisons and then synthesizes the results. Also, it is relatively free as compared to other commercial software and effectively computes the individual steps including pairwise comparisons, normalization, weights synthesis, consistency indices, among others.

3.5 Stage 3: Data Collection and Methods

This study is descriptive in nature and therefore an interview guideline based on AHP matrix format as proposed by Saaty (1980) was designed to solicit views on the level of effects of selected lean tools from professionals through AHP survey. The aim of AHP survey is to evaluate whether the perceived criteria selection is/are more important and widely used in the construction industry. Because of the nature and objective of this study only, relevant experts in the construction industry were invited for empirical inquiry, as the aim of the study requires analytical thinking and wealth of experience in the chosen domain. Experts were asked to stick their opinions on the delay sources and to indicate which alternative(s) is/are mostly suitable for the delay sources. Meanwhile, the interview took approximately eight months from the beginning of May 2015 to the end of November 2015. The data collection took longer period due to unavailability of experts and busy working schedules. Also, this current study used a convenience sampling.

The design of an interview guide or questionnaire to undertake a survey represents amongst the most controversial debate among researchers as far as precision in measuring experts' perceptions is concerned (Sato, 2003; 2004). There are several interview guide (questionnaire) formats used by researchers. Multiple-choice, one of the conventional methods, is profoundly used because respondents find them simple and easy to answer. In the multiple-choice formats, respondents must pick one or sometimes top two (or more) from among the given options (Sato, 2003). That is, it only identifies just the most important option for every respondent, in this manner keeping the respondent from communicating his or her preference regarding a selected option over the others. Moreover, no information with respect to the relationship among the non-selected options is obtained (Sato, 2003). Categorically, the distinction in the level of importance among the selected options/alternatives is not explained, nor is the information regarding non-selected options revealed in the results. However, one conceivable option for such survey research is to use AHP; one of the most prominent MCDM methods for decision-making. In the AHP process, data on judgments or preferences made by the experts or decision makers, known as pair-wise comparisons, are weighted, and the level of significance of each alternative is measured. This procedure distinguishes not only the most important alternative but also the judgment for all alternatives for every decision-maker. Consequently, by applying the AHP to undertake research surveys, respondents' preferences would be more precisely clarified than using traditional methods (Sato, 2004).

The scope of this study is the construction industry and Malaysia is used as a case study tool. In order to achieve the third objective of this study, the key invited experts were from construction companies with expertise and experience in projects and lean tools application. Upon researcher's consultation with Construction Industrial Development Board (CIDB), a list of 10 construction companies was presented as the contractors in their database as construction companies with knowledge and experience in lean management (refer to Appendix D for a list of contractors). Also, these companies are classified as the highest grade of contractors based on their portfolios, experience and activities in the industry (CIMP, 2007). Consequently, the key invited experts are a total of 11 companies, which are made up of the 10 contractors and 1 government institution (CIDB). CIDB is a government regulatory body for the construction industry in Malaysia (CIMP, 2007). According to CIDB, the practice of lean management in the construction industry is at its initial stages, however, the 10 companies are contractors in their database who are engaging lean management tools in their construction project activities.

In as much as the population is concerned, this study finds that there is no problem for population or sample size for at least two reasons. Firstly, the population meets the requirement of AHP approach, which stipulates that there is no universal method for population and sample size specification for AHP (Duke & Aull-Hyde, 2002; Xiao, 2010). This means that AHP could be applied to the opinions of small group as well as large group; however, the population or sample size may be dictated by the nature of the issue investigated, availability of experts for the study and even the time for which the interview or questionnaire could be completed by the expert (Duke & Aull-Hyde, 2002; Xiao, 2010). In this study, the average response time for completion of the interview was not less than eight hours.

Secondly, AHP is not a statistically based method that requires some statistical sample power. Duke & Aull-Hyde (2002) strongly argued that because AHP is not statistically based method, just two or more experts may be used for AHP group decision-making analysis. This was supported by Harath & Prato (2006) in their book "Using Multi-criteria Decision Analysis in Natural Resource Management". It is observed that AHP methodology is a subjective approach which does not as a matter, of course, require a large number of respondents to participate in AHP process and to adequately generate valuable and reliable results (Cheng & Li, 2004). For example, four respondents with experience in construction projects were used to solicit information on the significant criteria of the decision hierarchy. They recognized that "in spite of the fact that opinions given by four experts might just give a rough picture, it is an appropriate fit for AHP process and the study" (Cheng & Li, 2004).

Data was gathered through semi- structured interview designed based on MCDM-AHP, which has been tailored to allow evaluation and prioritization. The main sources and the effects of the lean tools in controlling the delay sources were evaluated and ranked. Thus, MCDM ranks the main delay sources (Criteria) to find out which specific source(s) needs more attention and then rank the lean tools (Alternatives) on the main delay sources to establish their effects on controlling the sources and highlight which specific tool(s) should be used to address a specific delay. Meanwhile, to make the result of this study more reliable and refined, a pre-data checking was conducted prior to the actual interview with experts to check the suitability of the proposed criteria identified from the literature review and to examine the comprehensiveness of the interview guide before the actual interview. The interview focused on experts' opinion, experience and knowledge of construction project delays and lean management tools and they were asked to prioritize the selected criteria and to distinguish in general the criteria which are more or less important. The experts were experienced professionals involved in the construction project.

3.6 Stage 4: Goodness of Results

Finally, based on the result of the analysis and the consistency test, the necessary modification was made and conclusion from the result is drawn, highlighting all the lean tools in order of their level of effects respectively.

In order to enhance the data quality, the following approaches of data preparation including, the validity of data collection tool, the reliability of data, the consistency of results and the external validity of findings were adopted.

3.6.1 Content Validity of Data Collection Tool

Even though all the indicators in the interview guide were adapted from the literature, it is necessary to determine the content validity of the indicators or the variables since they have been used in a different context from the current study. Establishing content validity is an important step in most studies (Burton & Mazerolle, 2011). Validity may be defined as the level of agreement between the claimed measurement and the real world (Lawshe, 1975). According to Stangor (2011), content validity is defined as "the extent to which the measured variable appears to have adequately covered the full domain of the conceptual variable". It tries to answer the question of whether an ongoing study covers every construct item expected to answer the survey question. Content validity is assessed through a panel of experts and a field test (Ko & Pastore, 2005; Hair et al., 2010). Also, the content validity can be determined through literature reviews and expert panels (Straub, 1989). Beck & Gable (2001), DeVon et al. (2007) and Lawshe (1975) described content validity as professional based judgments of test content relevancy to the content of the test domains, and representation of items to their domains. Thus, assessment of the content is mainly subjective to the judges or experts (Allen & Yen, 1979).

To test the content validity before data collection, five experts were asked to check the construct items, measurement scale, readability, comprehensiveness and suitability of the model. The experts for this study were mainly individuals with knowledge and more than two years' experience in construction projects as well as lean management tools application. Consequently, the construct items, measurement scale, and the interview guide were endorsed and found to be relevant for the intended research issue or domain by the experts and this maximized the validity of the indicators.

3.6.2 Reliability of Data

Reliability denotes the consistency of an item or set of items in what it is intended to measure (Hair et al., 2010). Therefore, by measuring the reliability of each construct, the items that form an internally consistent scale are identified early and items which do not belong to the construct are eliminated (DeVon et al., 2007). Besides, an assessment of reliability ensures that the adapted items are suitable and properly worded in the current study context. The significance of reliability lies in the fact that it is an essential for a validity of a study. In other words, for the validity of a measuring instrument to be sustained, it should be demonstrably reliable. Any measuring instrument that does not reflect consistently to some attribute has a low likelihood of being considered a valid measure of that attribute (Hair et al., 2010). The researcher undertook a preliminary interview (checking of data collection tool) to check the suitability of the proposed model and the comprehensibility of the interview guide through experts' opinions and experience. The interview guide was developed based on AHP samples and steps. Consequently, before data collection, five experts were asked to comment on the reliability of the interview guide and construct items based on their experience. The opinion scaling for AHP was refined to ensure the reliability of the measurement scale. Checking of data collection tool was undertaken to ensure that respondents have a good understanding of the construct items without any difficulty. In addition, it was conducted to validate the variables, terms, and instruments in terms of content and clarification of instructions, and to estimate the response rate and time for the interview. The reason for using the interview guide was to improve the validity and reliability, and also to clear any doubts and to answer any questions from the experts for further clarification.

3.6.3 Consistency of Results

At the end of the refinement of procedure, the data provided are refined to the level of AHP analysis. One of the challenges associated with data that can contribute to data bias is the subjectivity in experts' opinions. Thus, AHP includes sensitivity analysis in its computations. This requirement is consistent with one main guideline: AHP analysis requires consistency of pair-wise comparison matrix to be less or equal to 0.10 (CR ≤ 0.10), and once this is satisfied the analysis is said to be satisfactory (Tayfun & Uyan, 2013). The result of this research are analyzed based on the AHP consistency test and also the conclusion is drawn, highlighting all the priority vectors and the constancy ratio.

According to Tayfun & Uyan (2013), to achieve consistency there are some steps of calculation to follow and these steps have been illustrated in the Eq. (3.4) below:

$$A\,X\,C = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} X \begin{bmatrix} C_1 \\ C_2 \\ \vdots \\ C_n \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} \quad 3.4$$

At this stage, the consistency of the weights values (C_i) will then have to be controlled and to do this consistency vector is calculated (A x C Matrix). After this, x_i is calculated by multiplying A and C (A x C) to achieve the second, best approximation to the eigenvector. This is shown in the equation below (Tayfun & Uyan, 2013);

Also, an estimation of λ_{max} will be calculated using the below formula in Eq. (3.5).

$$\lambda_{max} = \sum_{i=1}^{n} \frac{x_1}{C_1} \quad 3.5$$

Where λ_{max} is the eigen-value of the pair-wise comparison matrix, then approximation to the consistency index (CI) is calculated as expressed in Eq. (3.6) (Tayfun & Uyan, 2013).

$$CI = \frac{\lambda_{max} - n}{n-1} \quad 3.6$$

More also, consistency judgment for appropriate value of n by consistency ratio (CR) is checked in order to ensure the consistency of pair-wise comparison matrix, as indicated in the representation below;

$$CR = \frac{CI}{RI} \quad 3.7$$

Where RI represent the random index and RI values for different numbers of n as shown in the table below:

Table 3.2 AHP Random Index Table

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

However, in a situation where there is a greater dimension of larger numbers of alternatives or criteria, Alonso & Lamata (2006) proposed a set of RI values to address this issue. This study contains around 40 alternatives and in that regards an estimated RI value of 1.7 (Alonso & Lamata, 2006) is used for computation. In estimating RI value to greater dimensions, first, calculate the 'n' numbers of n. This is represented by the equation below;

$$\bar{\lambda}_{max}(n) = 2.7699n - 4.3513 \quad 3.8$$

Where n represents the number of the dimension. After estimating the RI value by using the equation below;

$$RI = \frac{\bar{\lambda}_{max} - n}{n-1} \quad 3.9$$

Finally, if CR ≤ 0.10 then the degree of consistency is satisfactory; but if CR is > 0.10 then there is an indication of serious inconsistencies Tayfun & Uyan, 2013).

3.6.4 External Validity of Findings

External validity is the extent to which the conclusions in a study would hold for different persons in different places and at different times. It is the degree to which results of a study could be generalized up to the real world situation (Thomson & Thomas, 2012). To determine the external validity of research studies, research must give necessary information including population characteristics, outcomes among others to the intended experts and based on that the experts can determine whether the findings are relevant to their specific setting. While internal validity measures whether study results can be attributed to the constructs, external validity could improve the usefulness of research findings and possibly the quality of available evidence (Thomson & Thomas, 2012). To ensure the validity of the findings, an expert in the study domain was asked to assess whether or not the findings of the study could be generalized to a real world setting and are relevant for the intended domain. All the reported variables, constructs, and models were found to be related to the findings. Also, details of the reported findings were adequate and comprehensive. Consequently, the expert endorsed the findings as being adequately reported and relevant to the domain under study.

3.7 Chapter Summary

In this chapter, a detailed description and justification of the research methodology have been provided. The structure including the fundamental stages, individual steps and sequential processes of the method for executing the objectives of are also discussed. Also, interview guide design, AHP model development, data collection and methods, and analysis techniques are highlighted. Meanwhile, MCDM-AHP is the main method that is used for this study. To enhance data quality, content validity of data collection tool, the reliability of data, consistency of results and external validity of findings have been adopted in this study.

CHAPTER 4

DATA ANALYSIS

4.1 Introduction

This chapter describes the AHP analysis for the proposed models from the interview results. Each delay source in each model (Model I & Model II) against the Alternatives (40 Lean Tools) is analyzed to determine their weight and established which Alternative(s) is/are able to control which Criteria (delay source) in the proposed framework. The analysis and the results are organized into three main parts. Specifically, Part I presents a general overview of response rate and descriptive statistics of the experts. Part II concentrates on the analysis of Model I (4Ps) to establish the weightings of the Alternatives on the respective Criteria through pairwise comparison, weight synthesis, and consistency tests. Here, Model I consisting of the Internal Delay Sources namely; Project Management related sources; Project Related or Project Scope sources; Project Participants related sources; and Procurement related sources (4Ps) are ranked to determine where project teams should focus attention with their limited resources. Likewise, Part III covers analysis of Model II (PESTLE), consisting of the External Delay Sources namely; Political; Economic; Social; Technological; Legal; and Environment.

4.2 Part I: Descriptive Statistics of Experts' Demographic Background

This section provides information about the response rate and experts' demographic characteristics. Also, the appropriate statistical procedure for descriptive statistical analysis, including percentages and frequencies are used to present the main characteristics of the population.

4.2.1 Response Rate and Experts Demography

Upon the researcher's consultation with Construction Industrial Development Board (the government department which is responsible for regulating the contractors in Malaysia), a list of top 11 contractors was obtained and was therefore invited for further empirical inquiry. Consequently, 10 key respondents out of 11 with high expertise in construction projects and lean tools application responded. Out of the 10 respondents, there were 9 construction companies and 1 government institution (CIDB). See Appendix H for information of the companies.

Also, descriptive statistics on experts' demography has been provided to provide some basic quantitative descriptions about the data. This is illustrated in Table 4.1 to 4.4

Table 4.1 Number of Years Spent in Company

Years	Frequency	Percent
Less than 2 year	-	-
2 - 5	6	60.0
5- 10	3	30.0
More than 10 years	1	10.0
Total	10	100.0

Table 4.1 indicates the distribution of respondents according to the numbers of years they have spent in their respective companies. The majority of the respondents have been in their present company for between two to five years, representing 60.0% (n = 6). Also, 30.0% (n = 3) has spent between six to ten years and 10.0% (n = 1) has spent more than ten years. Finally, none of the experts fall within less than two years.

Table 4.2 Age Distribution

Age	Frequency	Percent
Less than 20 years	-	-
20 – 29	4	40.0
30 – 39	3	30.0
40 – 49	2	20.0
50 and above	1	10.0
Total	10	100.0

preferences in the form of weights and scores for the Alternatives were computed using Microsoft Excel 2013. The elements in each level were compared with each other using the values as indicated in Appendices A and B respectively. Synthesis of the weights from the pair-wise comparisons was done and their normalized values were calculated to obtain their respective eigenvalues. For every criterion (Project Scope Delays, Project Management Delays, Project Participants Delays and Procurement Delays) pairwise comparisons are made for the alternatives, that is, forty lean tools. Further information on the alternatives for this model has been presented in Table 4.5.

Table 4.5 Alternatives

	Lean Tools	Literature support
(A_1)	Fail Safe for Quality	(Salem et al., 2005; Rahman et al., 2012)
(A_2)	Construction Process Analysis	(Lee et al., 1999; Rahman et al., 2012)
(A_3)	5S	(Rahman et al., 2012; Muhammad et al., 2013)
(A_4)	Work Structuring	(Tsao et al., 2004; Rahman et al., 2012
(A_5)	Statistical Process Control (SPC)	(Alireza & Sorooshian, 2014)
(A_6)	Concurrent Engineering	(Rahman et al., 2012; Aziz & Hafez, 2013)
(A_7)	Muda Walk	(Rahman et al., 2012; ASQ, 2015)
(A_8)	5 Whys	(Tsao, et al., 2004; Muhammad et al., 2013)
(A_9)	Synchronize/Line Balancing	(Alireza & Sorooshian, 2014)
(A_{10})	Heijunka (Level Scheduling)	(Alireza & Sorooshian, 2014)
(A_{11})	Failure Mode and Effects Analysis (FMEA)	(Rahman et al., 2012; Alireza & Sorooshian, 2014)
(A_{12})	Team Preparation	(Alireza & Sorooshian, 2014)
(A_{13})	SMART Goals	(Leanproduction.Com, 2015)
(A_{14})	Total Productive Maintenance (TPM)	(Alireza & Sorooshian, 2014)
(A_{15})	Time and Motion Study	(Alireza & Sorooshian, 2014)
(A_{16})	Value Stream Mapping	(Rahman et al., 2012; Leanproduction.Com, 2015)
(A_{17})	Just-In-Time	(Rahman et al., 2012; Muhammad et al., 2013; Aziz & Hafez, 2013)
(A_{18})	First Run Studies	(Salem et al., 2005; Rahman et al., 2012; Muhammad et al 2013)
(A_{19})	Pareto Analysis	(Rahman et al., 2012)
(A_{20})	Continuous Flow	(Aziz & Hafez, 2013; Alireza & Sorooshian, 2014)
(A_{21})	Last Planner System (LPS)	(Rahman et al., 2012; Muhammad et al., 2013; Aziz & Hafez, 2013)
(A_{22})	Check Sheet	(Rahman et al., 2012)
(A_{23})	Kaizen	(Alireza & Sorooshian, 2014)
(A_{24})	FIFO line (First In, First Out)	(Alireza & Sorooshian, 2014)
(A_{25})	Set up reduction	(Alireza & Sorooshian, 2014)
(A_{26})	Bottleneck Analysis	(LeanProduction.Com, 2015)
(A_{27})	Suggestion schemes	(Alireza & Sorooshian, 2014)

(A_{28})	Multi-Process Handling	(Alireza & Sorooshian, 2014)
(A_{29})	Check Points & Control Points	(Rahman et al., 2012)
(A_{30})	Preventive Maintenance	(Rahman et al., 2012; Alireza & Sorooshian, 2014)
(A_{31})	Kanban (Pull System)	(Rahman et al., 2012)
(A_{32})	Work Standardization	(Rahman et al., 2012; Muhammad et al., 2013)
(A_{33})	Visual Management	(Rahman et al., 2012; Muhammad et al., 2013)
(A_{34})	Poka-Yoke (Error Proofing)	(Muhammad et al., 2013; Alireza & Sorooshian, 2014)
(A_{35})	Six Sigma	(Rahman et al., 2012; Alireza & Sorooshian, 2014)
(A_{36})	Daily Huddle Meetings	(Salem et al., 2005; Rahman et al., 2012; Muhammad et a 2013)
(A_{37})	Root Cause Analysis	(Leanproduction.Com, 2015)
(A_{38})	PDCA (Plan, Do, Check, Act)	(Leanproduction.Com, 2015)
(A_{39})	Jidoka/Automation	(Alireza & Sorooshian, 2014)
(A_{40})	Quality Function Development (QFD)	(Alireza & Sorooshian, 2014)

Following the steps of AHP methodology model development and the steps in chapter 3, the relative value of each alternative with respect to each criterion obtained from experts through pairwise comparison. Synthesis of the weights from the pair-wise comparisons was done and their normalized values were calculated to obtain their respective eigenvalues and priority estimates. To ensure the consistency in all the reciprocal matrices, consistency indices (CI) and consistency ratios (CR) were computed using the largest eigenvalues of eigenvectors as shown in table 4.6 (refer to the appendix D for supplementary information).

The highest priority vector values for Criteria 1 (Project Related/Scope) were recorded at 0.069101, 0.067316, and 0.066316 for the alternatives A21, A36, and A6, meanwhile, the lowest priorities were recorded at 0.005302, 0.005302, and 0.005339 for A13, A28 and A14 respectively. Also, the average lambda(max) was recorded at 42.77, with CI and CR recorded at 0.071025641 and 4.18% respectively (see table 4.8 in appendix D).

Similarly, the highest priorities in descending order for Criteria 2 (Project Management) were computed at 0.077772, 0.072787, and 0.069636 for alternatives A21, A6, and A36, whilst the lowest priorities were recorded at 0.004382, 0.004382, and 0.004965 for A13, A28 and A14 respectively. Moreover, the average lambda(max) was recorded at 43.57, with CI and CR computed at 0.091538462 and 5.38% respectively (see table 4.9 in appendix D).

Also, the alternatives in order magnitude for Criteria 3 (Project Participants) were A6, A21, and A36 with values 0.066287, 0.063798, and 0.061161, however, the lowest priorities were recorded at 0.004439, 0.004439, and 0.004447 for A13, A28 and A15 respectively. The average lambda(max) was recorded at 44.07, with CI and CR computed at 0.104358974 and 6.14% respectively (see table 4.10 in appendix D).

More also, the highest priorities in order magnitude with respect to Criteria 4 (Procurement) were 0.068599, 0.067140, and 0.064254 for A6, A21, and A36, however, the lowest priorities were 0.004752, 0.004991, and 0.004991 for A15, A13, and A28 respectively. Moreover, the average lambda(max) was recorded at 40.23, with CI and CR computed at 0.005897436 and 0.35% respectively (see table 4.11 in appendix D).

To calculate the overall priorities to determine the suitable alternative(s) for the model, all the priorities for each alternative with respect to all the criteria were computed. Figure 4.1 illustrates the overall priority and their respective ranking. Also, from the analysis, it could be observed that the top 10 alternatives with the highest priorities in order importance with respect to all the criteria were A21, A6, A36, A3, A18, A33, A1, A2, A31 and A17, with values 0.277812, 0.273989, 0.262368, 0.167153, 0.167153, 0.166758, 0.160675, 0.156452, 0.156175 and 0.156077 respectively. Meanwhile, the lowest 10 priorities were recorded at 0.038259, 0.037832, 0.037832, 0.037832, 0.024701, 0.024701, 0.020803, 0.020803, 0.019114 and 0.019114 for A27, A10, A25, A40, A14, A29, A15, A30, A13 and A28 respectively (see table 4.12 in appendix D).

To check inconsistencies in the experts' opinions, a consistency analysis was computed to ensure satisfaction and consistency in the model's results. This is illustrated in Table 4.6 below.

Table 4.6 Consistency Analysis

Criterion	λmax	RI	CI	CR	%
Project Scope	42.77	1.7	0.071025641	0.041779789	4.18%
Project Management	43.57	1.7	0.091538462	0.053846154	5.38%
Project Participants	44.07	1.7	0.104358974	0.061387632	6.14%
Procurement	40.23	1.7	0.005897436	0.003469080	0.35%

Table 4.6 presents an analysis of the model's consistency for each criterion. The average ***λmax*** was recorded at 42.77, 43.57, 44.07 and 40.23 for the criterion respectively. The RI is computed at 1.7 for each criterion. Similarly, the CI is recorded at 0.071025641, 0.091538462, 0.104358974 and 0.005897436, with CR showing 0.041779789, 0.053846154, 0.061387632 and 0.003469080. Likewise, the percentages in the CR is computed at 4.18%, 5.38%, 6.14% and 0.35% for Project Scope, Project Management, Project Participants and Procurement respectively. This shows satisfactory results since all the inconsistencies were less than 0.1 or the CR is less than 10%.

Meanwhile, Figure 4.1 illustrates the priorities and their respective ranking through a line chart. The top priority values in descending order as indicated by the data point show 0.277812, 0.273989 and 0.262368 for the alternatives A21, A6, and A36 respectively. Similarly, the data point indicates 0.020803, 0.019114 and 0.019114 as the lowest priorities for A15, A30, A13, and A28 respectively.

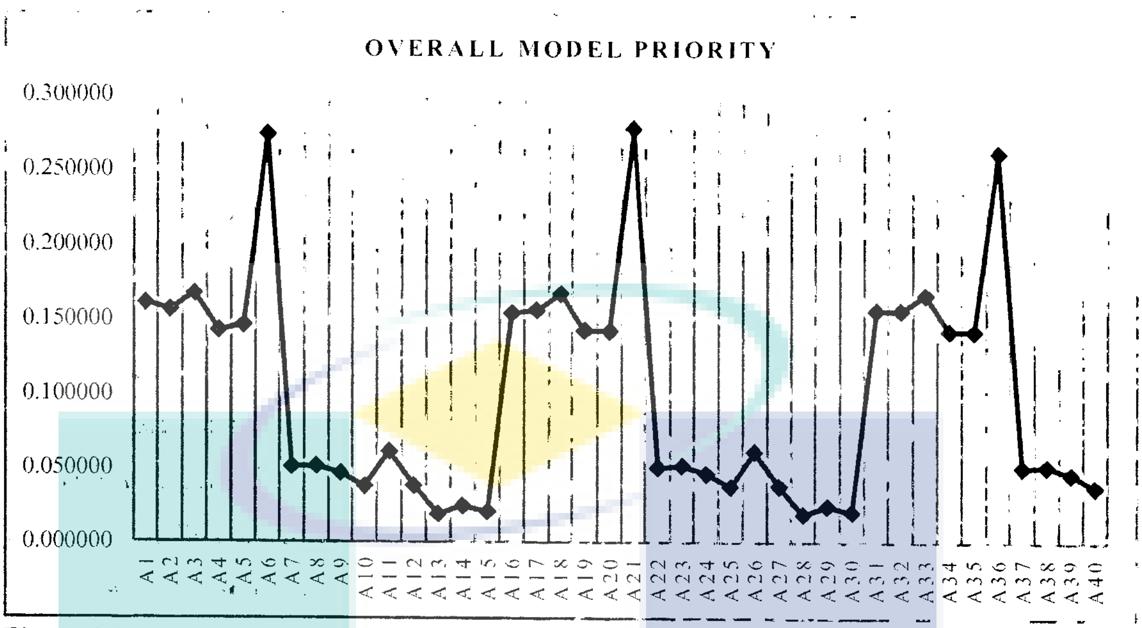

Figure 4.1 Overall Model I Priority

Alternatively, Figure 4.2 illustrates the overall priorities for the model in Bar Chart, with A21, A6, A36, A3, A18, A33, A1, A2, A31 and A17 being the most suitable alternatives and A27, A10, A25, A40, A14, A29, A15, A30, A13, and A28 least suitable alternatives. This chart indicates all the alternatives from the top most suitable tools to the least suitable tools, with their priorities respectively.

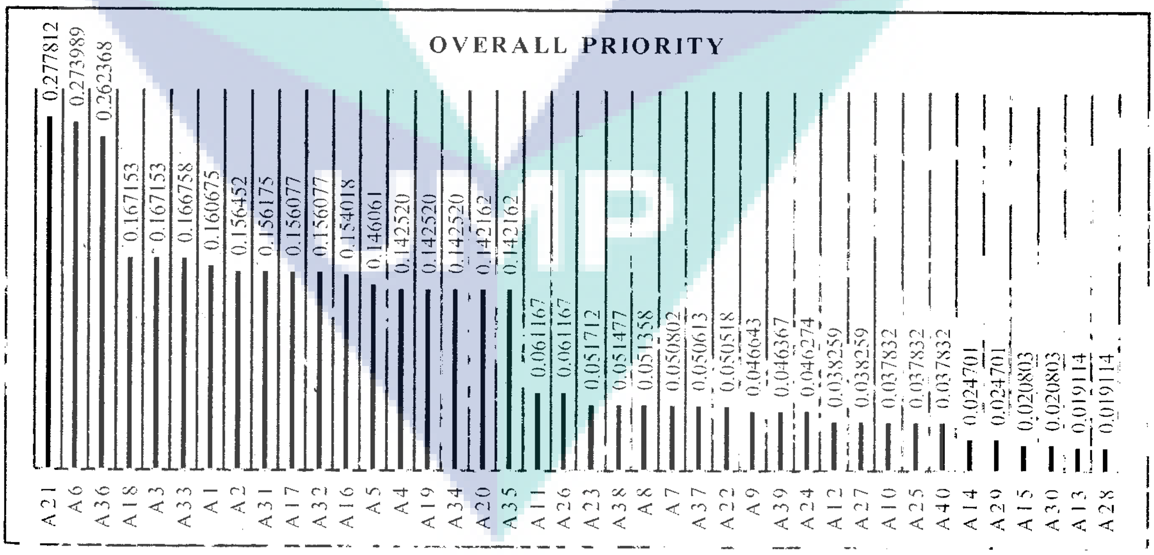

Figure 4.2 Overall Model I Priority

4.4 Part III: Model II

This section presents analysis of the second conceptual model. Similarly, the steps of calculation in section 4.3 (Model I) was followed by this section. The weights and scores of the alternatives were computed with respect to each criterion. The criteria in this model include; Political, Technology, Economic, Social, Legal and Environment respectively. The elements in each level were compared with each other using the values as indicated in Appendices A and B respectively. Synthesis of the weights from the pair-wise comparisons was done and their normalized values were calculated to obtain their respective eigenvalues. For each criterion pairwise comparisons are made for the alternatives, that is, forty lean tools. The same set of alternatives and description in section 4.3 are used in this model.

Even so, eigenvalues and their priority vectors were computed for each alternative with respect to all criteria. Table 4.13 to Table 4.18 (refer to appendix D) show the eigenvalues and priority values as calculated after synthesis and normalization of the weights of the alternatives for the criterion respectively. Furthermore, to ensure the goodness of the framework, the consistency indices (CI) and consistency ratio (CR) in all the reciprocal matrices were computed using the largest eigenvalues of eigenvectors as indicated in figures 4.3 and 4.4 (see the appendix D for supplementary information).

Firstly, the alternatives with the highest priorities for Criterion 1 (Political) in order magnitude were A6, A16, and A21 with values 0.073027, 0.066672 and 0.057484, however, the lowest priorities were recorded at 0.004609, 0.004248 and 0.003953 for A29, A13 and A30 respectively. The average lambda(max) was recorded at 41.99, with Consistency Index (CI) and Consistency Ratio (CR) computed at 0.051025641 and 3.00% respectively (refer to table 4.13 in appendix D).

Similarly, the highest priorities for Criterion 2 (Economic) in descending order were computed at 0.072381, 0.071454 and 0.060975 for alternatives A21, A6, and A36, whilst the lowest priorities were recorded at 0.004173, 0.004173 and 0.004779 for A28, A13 and A14 respectively. Besides, the average lambda(max) was recorded at 44.00, with Consistency Index (CI) and Consistency Ratio (CR) computed at 0.102564103 and 5.26% respectively (refer to table 4.14 in appendix D).

Again, the highest priority values for Criterion 3 (Social) were recorded at 0.073671, 0.063905 and 0.063905 for the alternatives A6, A21, A36, meanwhile, the lowest priorities were recorded at 0.004335, 0.004301 and 0.004241 for A28, A13 and A30 respectively. The average lambda(max) was computed at 41.51, with Consistency Index (CI) and Consistency Ratio (CR) recorded at 0.038717949 and 2.28% respectively (refer to table 4.15 in appendix D).

Also, highest priority vector values Criterion 4 (Technology) were recorded at 0.066306, 0.063318 and 0.063318 for the alternatives A6, A21 and A36, whilst, the lowest priorities were recorded at 0.005203, 0.004988 and 0.004855 for A13, A30 and A26 respectively. Also, the average lambda(max) was recorded at 41.75, with Consistency Index (CI) and Consistency Ratio (CR) recorded at 0.044871795 and 2.64% respectively (refer to table 4.16 in appendix D).

More also, the priorities with the highest values in descending order for Criterion 5 (Legal) were 0.066486, 0.065814 and 0.064820 for the alternatives A36, A6, and A21, meanwhile, the lowest priorities were 0.004528, 0.004245 and 0.004234 for A14, A15, and A13 respectively. The average lambda(max) was recorded at 43.06, with Consistency Index (CI) and Consistency Ratio (CR) recorded at 0.078461538 and 4.62% respectively(refer to table 4.17 in appendix D).

Furthermore, the alternatives in order magnitude for Criterion 6 (Environment) were A6, A36, and A21 with values 0.074963, 0.059003 and 0.057743, however, the lowest priorities are recorded at 0.004908, 0.004406 and 0.003966 for A14, A13, and A30 respectively. Also, the average lambda(max) was recorded at 40.34, with Consistency Index (CI) and Consistency Ratio (CR) recorded at 0.008717949 and 0.51% respectively (refer to table 4.18 in appendix D).

To estimate the overall priorities to determine the suitable alternative for the model, all the priorities for each alternative with respect to all the criteria were computed. Figure 4.3 illustrate the overall priority and their respective ranking. From the above table, it could be observed that the top 10 alternatives with the highest priorities in order importance with respect to all the criteria were A6, A21, A36, A31, A3, A16, A17, A1, A32 and A5, with values 0.425235, 0.379652, 0.371172, 0.295055, 0.281916, 0.260790, 0.234905, 0.232547, 0.229434 and 0.221235 respectively. Meanwhile, the lowest 10 priorities were recorded at 0.058945, 0.056275, 0.054402, 0.042144, 0.040878, 0.038968, 0.031181, 0.029223, 0.027402 and 0.026566 for A25, A10, A27, A29, A12, A28, A15, A14, A30 and A13 respectively (see table 4.19 in appendix D).

Furthermore, the priorities and their respective ranking were presented in a line chart. The top priority values in descending order as indicated by the data point indicate 0.425235, 0.379652 and 0.371172 for the alternatives A6, A21, and A36 respectively. However, the data point indicates 0.029223, 0.027402 and 0.026566 as the lowest priorities for A14, A30 and A13 respectively. This is illustrated in Figure 4.3.

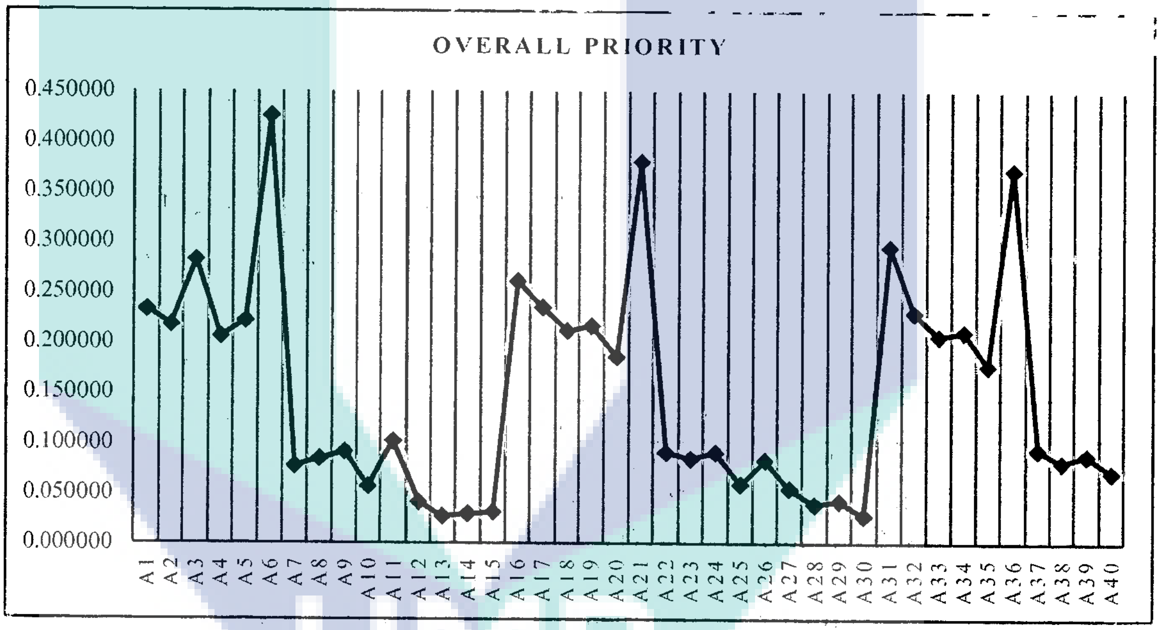

Figure 4.3 Overall Model II Priority

Alternatively, Figure 4.4 illustrates the overall priorities for the model in a Bar Chart, with A6, A21, A36, A31, A3, A16, A17, A1, A32 and A5 being the most suitable alternatives and A25, A10, A27, A29, A12, A28, A15, A14, A30, and A13 least suitable alternatives. This chart indicates all the alternatives from the top most suitable tools to the least suitable tools.

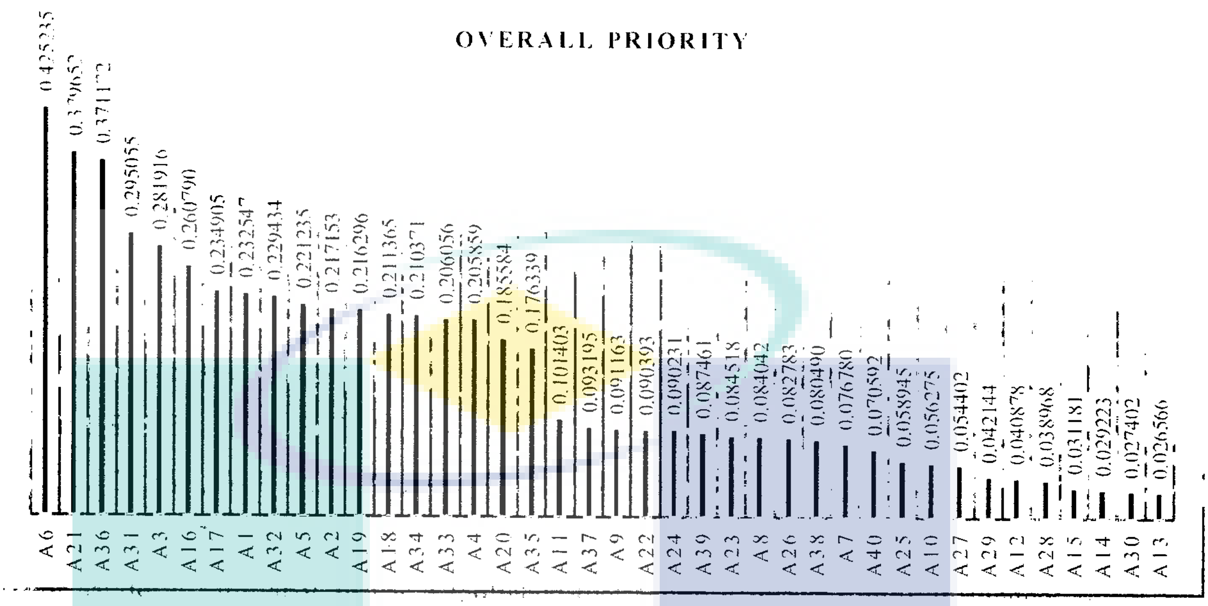

Figure 4.4 Overall Model II Priority

To analyze inconsistencies in the model results, a consistency analysis was computed to ensure satisfaction and consistency. This is illustrated in Table 4.7 below.

Table 4.7 Consistency Analysis

Criterion	λmax	RI	CI	CR	%
Political	41.99	1.7	0.051025641	0.030015083	3.00%
Economic	44.00	1.7	0.102564103	0.060331825	6.03%
Social	41.51	1.7	0.038717949	0.022775264	2.28%
Technology	41.75	1.7	0.044871795	0.026395173	2.64%
Legal	43.06	1.7	0.078461538	0.046153846	4.62%
Environment	40.34	1.7	0.008717949	0.005128205	0.51%

Table 4.7 presents an analysis of the model's consistency for each criterion. The average ***λmax*** was recorded at 41.99, 44.00, 41.51, 41.75, 43.06 and 40.34 for the criterion respectively. The RI was computed at 1.7 for each criterion. Likewise, the CI is computed at 0.051025641, 0.102564103, 0.038717949, 0.044871795, 0.078461538 and 0.008717949, with CR showing 0.030015083, 0.060331825, 0.022775264, 0.026395173, 0.046153846 and 0.005128205. Also, the percentages in the CR for 2 decimal places was computed at 3.00%, 6.03%, 2.28%, 2.64%, 4.62% and 0.51% for Political, Economic, Social, Technological, Legal and Environmental Sources respectively. This shows satisfactory results since all the inconsistencies were less than 0.1 or the CR is less than

10%.

4.5 Chapter Summary

This chapter describes the AHP analysis for the proposed models from the interview results. Each Criteria in each model (Model I & Model II) was analyzed with respect to the Alternatives. The analysis and the results were organized into three main parts. Part I presented a general overview of response rate and descriptive statistics of the experts. Part II covered analysis of Model I (4Ps) and Part III covered analysis of Model II (PESTLE). Based on the findings, Model I was found to be strongly influenced by A21, A6, A36, A3, A18, A33, A1, A2, A31, A17, among others. However, A27, A10, A25, A40, A14, A29, A15, A30, A13, and A28 were found to be the least suitable alternatives for Model I. Similarly, it was established that Model II was strongly influenced by A6, A21, A36, A31, A3, A16, A17, A1, A32 and A5, and least influenced by A25, A10, A27, A29, A12, A28, A15, A14, A30 and A13 least suitable alternatives.

To ensure the validity of the findings, an expert was asked to check the findings, its suitability for the model and Malaysian construction industry. The expert is an individual with knowledge and more than five years' experience in construction projects as well as lean management tools application. Accordingly, the findings were endorsed and found to be relevant for the model, research domain and highly feasible for knowledge and practice on delay control.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter presents a discussion of the empirical findings obtained from the data analysis of chapter four with regards to theoretical significance, methodological rigor, and practical contribution. The chapter briefly discusses the entire findings addressing the proposed research models. Likewise, discussion on how the results fill the existing knowledge gaps and make significant contributions in the context of delay control through lean tools adoption in Malaysian construction industry has been highlighted. Explicitly, the contributions highlight that the study extends knowledge of lean tool adoption conceptualization, validating the research models using MCDM-AHP and providing practitioners with tools for analyzing and controlling construction projects delays. Also, delay control framework for the models is designed based on the lean tools. Finally, the chapter discusses the limitations and future research spotlights with concluding remarks.

5.2 Findings and Discussion

To solicit data on lean tools adoption, its' applicability and effectiveness in controlling delays in Malaysian construction industry, an interview-based survey with experts were conducted by the researcher. The preferences from the experts were then analyzed to address the main research objective 3 and to validate the proposed research models. In achieving the research objective, the study developed and validated a context-specific 'Lean Tool-Delay Control' models. Based on the research findings, the internal sources of delays (Model I) namely; Project Scope Delays, Project Management Delays, Project Participants Delays and Procurement Delays (4Ps) are found strongly influenced by three alternatives (Lean Tools), that is, Last Planner System (LPS), Concurrent Engineering and Daily Huddle Meetings. Meanwhile, the least suitable lean tools are found to be Preventive Maintenance, SMART Goals, and Multi-Process Handling.

Specifically, the first criterion, which is Project Scope delays found Last Planner System (LPS), Daily Huddle Meetings and Concurrent Engineering as being the topmost influential lean tools. Meanwhile, the weak influential lean tools are Total Productive Maintenance (TPM), SMART Goals and Multi-Process Handling. Also, the most effective tools in order of importance with respect to the second criterion, which is Project Management delays are Last Planner System (LPS), Concurrent Engineering and Daily Huddle Meetings. However, the least effectual tools in order of importance are SMART Goals, Multi-Process Handling, and Preventive Maintenance. With respect to the third criterion, which is Project Participants delays, Concurrent Engineering, Last Planner System (LPS) and Daily Huddle Meetings are found to be most effective lean tools. Conversely, SMART Goals, Multi-Process Handling and Time and Motion Study are found to be the least effective tools. Similarly, the fourth criterion, which is Procurement delays found Concurrent Engineering, Last Planner System (LPS) and Daily Huddle Meetings to be the most effective lean tools, whilst, SMART Goals, Multi-Process Handling and Time and Motion Study are found to be the least effective tools.

Meanwhile, an assessment of the consistency in the experts' preferences indicated a consistency ratio (CR) for 2 decimal places of 4.18%, 5.38%, 6.14% and 0.35% for Project Scope, Project Management, Project Participants and Procurement respectively. This indicates a perfect or satisfactory consistency level for the model since the CR is less than 10% (Alam et al, 2012; Tayfun & Uyan, 2013).

These findings is consistent and supported by literature. For instance, the work of Rahman et al. (2012) indicated that among the lean tools including Last Planner System, Concurrent Engineering, Huddle Meetings are suitable for delay reduction or delay response for Malaysian construction industry. Likewise, the top 10 lean tools in descending order include; Last Planner System, Concurrent Engineering, Daily Huddle

Meetings, First Run Studies, 5S, Visual Management, Fail Safe for Quality, Construction Process Analysis, Work Standardization, Just-In-Time and Kanban (Pull System) for model I are strongly supported by the work of Faizul (2006), Hamid et al. (2009), and Rahman et al. (2012); as indicated in their an introductory lean implementation guide.

Even so, the external sources of delays (Model II) namely; Political Delays, Economic Delays, Social Delays, Technological Delays, Legal Delays and Environmental Delays (PESTLE) are found strongly influenced by three alternatives (Lean Tools), that is, Concurrent Engineering, Last Planner System (LPS) and Daily Huddle Meetings. Meanwhile, the least influenced lean tools are found to be Total Productive Maintenance (TPM), Preventive Maintenance and SMART Goals.

Clearly, the first criterion, which is Political delays found Concurrent Engineering, Last Planner System (LPS) and Value Stream Mapping as the topmost influential lean tools. Meanwhile, the weak influential lean tools are Check Points & Control Points, SMART Goals, and Preventive Maintenance. Also, the most effective tools in order of importance with respect to the second criterion, which is Economic delays are Last Planner System (LPS), Concurrent Engineering and Daily Huddle Meetings. However, the least effectual tools in order of importance are Total Productive Maintenance (TPM), SMART Goals and Multi-Process Handling. The third criterion, which is Social delays found Concurrent Engineering, Last Planner System (LPS) and Daily Huddle Meetings are found to be most effective lean tools. Conversely, Total Productive Maintenance (TPM), SMART Goals and Preventive Maintenance are found to be the least effective tools. The fourth criterion, which is Technological delays found Concurrent Engineering, Last Planner System (LPS) and Daily Huddle Meetings are found to be most effective lean tools. On the other hand, SMART Goals, Preventive Maintenance, and Bottleneck Analysis are found to be the least effective tools. Similarly, the five criterion (Legal delays) found Daily Huddle Meetings, Concurrent Engineering and Last Planner System (LPS) to be the most effective, whereas, Total Productive Maintenance (TPM), Time and Motion Study and SMART Goals are found to be the least effective. Finally, the six criterion, which is Environmental delays found Concurrent Engineering, Daily Huddle Meetings and Last Planner System (LPS) and are found to be most effective lean tools. On the other hand, Total Productive Maintenance (TPM), SMART Goals and Preventive Maintenance are found to be the least effective.

Meanwhile, the consistency analysis in the experts' rankings showed a consistency ratio (CR) for 2 decimal places of 3.00%, 6.03%, 2.28%, 2.64%, 4.62% and 0.51% for Political, Economic, Social, Technological, Legal and Environmental Sources respectively. This shows an acceptable consistency level or satisfactory results for the model since the CR is less than 10% (Tayfun & Uyan, 2013).

More also, the results from Model II is consistent and supported by literature. Rahman et al. (2012) indicated Concurrent Engineering, Last Planner System, and Huddle Meetings among the suitable lean tools that Malaysian construction industry should focus on for delay reduction or delay response. Likewise, as indicated in their introductory lean implementation guide, the suitable lean tools include; Concurrent Engineering, Last Planner System, Daily Huddle Meetings, First Run Studies, 5S, Value Stream Mapping, Visual Management, Fail Safe for Quality, Construction Process Analysis, Work Standardization, Just-In-Time and Kanban (Pull System) (Rahman et al., 2012). Similarly, Concurrent Engineering, Last Planner System, and Daily Huddle Meetings have been recommended as most suitable lean tools for Malaysian construction projects (Faizul, 2006; Hamid et al, 2009; Rahman et al., 2012; Muhammad et al., 2013).

Even though, there are some supporting literature for the findings of this study, it is quite different and the first of its own kind to rank lean tools based on their effect on controlling delays in Malaysian construction projects as the existing literature focus on lean application or and give a general overview of the tool(s) that ought to be used based on its application in other countries or industries (Hamid et al, 2009; Rahman et al, 2012). Rahman et al. (2012) proposed a waste management framework as an introductory lean implementation guide to address the existing delays and other wastes in the industry. Yet, Rahman et al. (2012) waste management framework only made a brief description and recommendation of about 27 lean tools to be considered by Malaysian construction industrial practitioners but did not indicate the applicability of such tools. Similarly, Muhammad et al. (2013) also highlighted only 9 tools for the Malaysian construction industry. Burton & Boeder (2003), Aziz & Hafez (2013), Evbuomwan & Anumba (1998), Hines & Rich (1997) and Tsao et al. (2004) have presented papers on the lean extended enterprise: Moving beyond the four walls to value stream excellence, Applying lean thinking in construction and performance improvement, integrated framework for concurrent life-cycle design and construction, the seven value stream mapping tools and work structuring respectively. Other studies include work of Ballard & Howell (1994), Johnston & Brennan (1996), Bashford et al. (2005), Sacks et al. (2010), Sarhan & Fox (2013), Marhani et al. (2013), etc.

While these works are worthwhile in relation to application of lean in the construction projects, they mostly do not establish the specific delay or waste control lean tools with regards to suitability and the specific tools to control specific delays, and thus, could not be concluded to be providing evidence of the suitability or applicability of lean tools in relation to the challenges posed by delays in construction projects. There is situation where lean tools application could fail and success and failure of lean tool implementation are dependent on the choice of the tool (Li, 2011; Anvari & Sorooshian, 2014).

5.3 Categories of Lean Tools

Based on the findings, the lean tools have been grouped into three main categories namely; Top Level, Middle Level, and Down Level. These categories have been done in order of importance based on the result of the priorities as discussed in chapter 4 (refer to Figure 4.2 and 4.4 in the previous chapter). These categories are further illustrated in Figure 5.1 and 5.2 for 4Ps (Model I) and PESTLE (Model II) respectively.

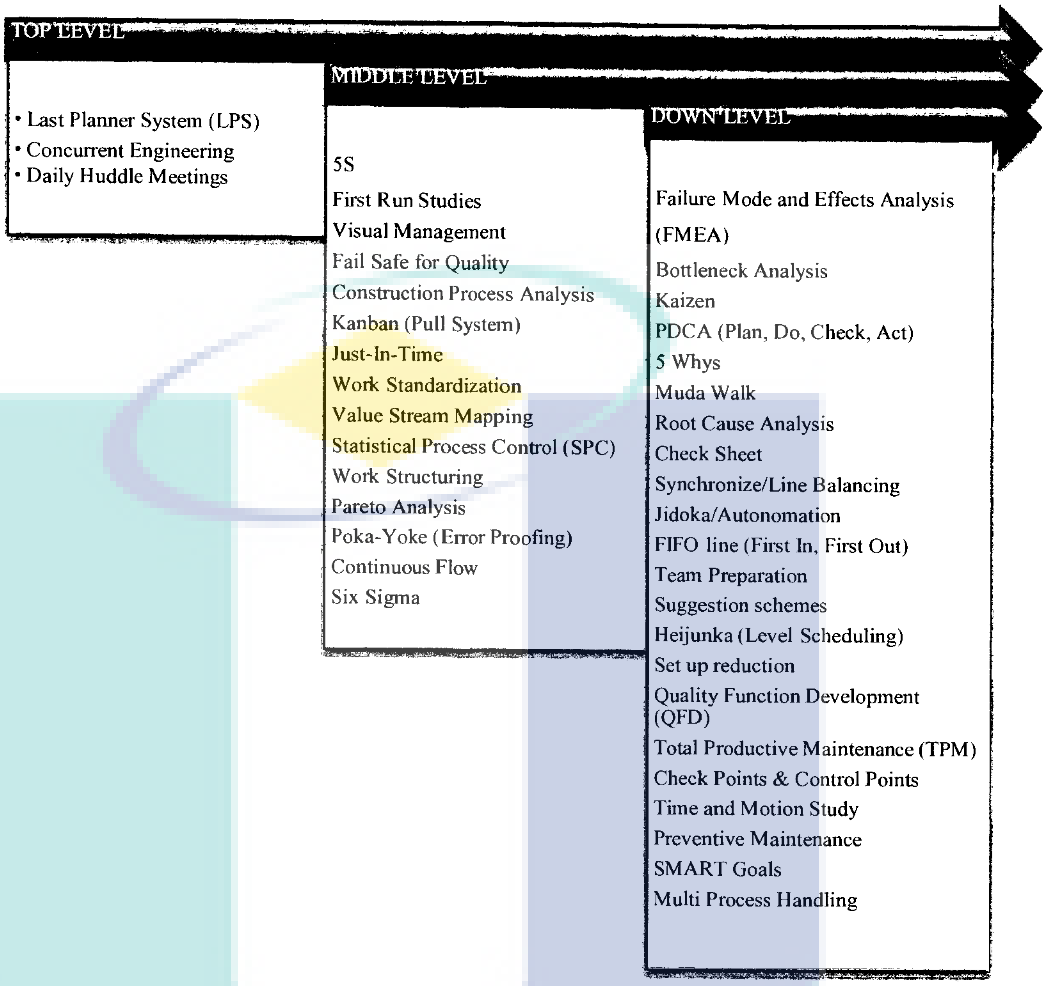

Figure 5.1 Category of Lean Tool for 4Ps

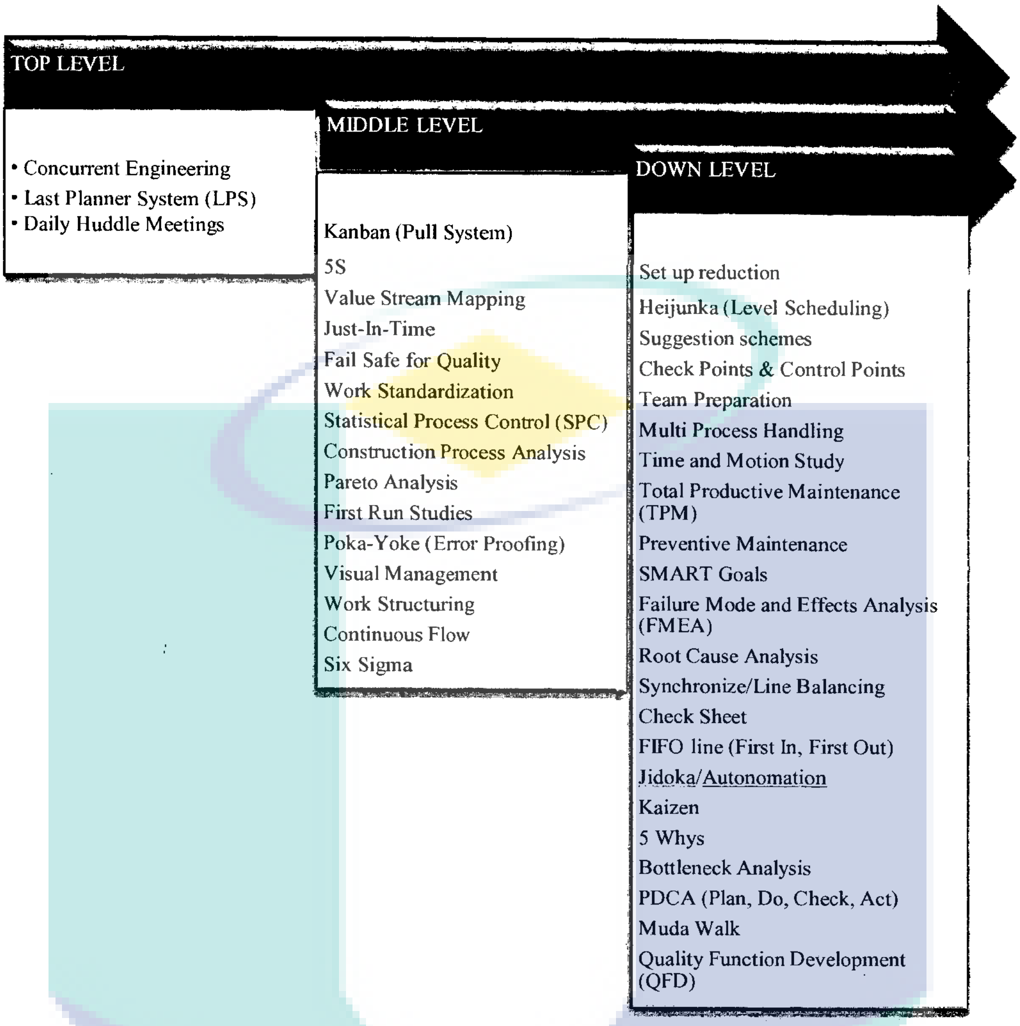

Figure 5.2 Category of Lean Tool for PESTLE

5.4 Contribution of the Study

The study discusses its contributions in terms of theory, methodology and practice. Theoretically, the study extends construction delay control research by incorporating lean tools as an integrated delay control tool and modeling its impact on delay sources in Malaysia. Methodologically, the study proves that MCDM-AHP could be used to estimate the parameters of a complex research model involving a number of criteria and alternatives. Practically, the study provides construction managements with a delay control models for conducting integrated introspective and retrospective analysis, and design of process delivery systems. Overall, the study makes a significant contribution to knowledge, improved project delivery, and if well understood, would lead to better performance of Malaysian construction industry.

5.4.1 Contribution to Theory

Although this current study was conducted in only the top construction companies, nevertheless, the findings of the study contributed to the literature by supporting and improving other findings and bridging the gap that exists in the body of literature. Thus, the findings encourage the implementation and further improvement of just in time construction project delivery. In general, this study extends construction delay control research by incorporating lean tools as an integrated delay control tool and modeling its impact on delay sources and explaining the research model in relation to construction project delay sources in Malaysia context.

Also, this research develops a systematically ranked framework for lean tools to control delays in Malaysian construction projects. Although it is an undeniable fact that the adoption of the lean tool in construction projects is very significant for delay control, but without a clear identification and ranking, reducing delays in the construction industry will be complicated. The stimulating point here is concerned with applicability and suitability of the lean tools. To deal with the suitability, applicability and effectiveness of the lean tools against the delay sources, this research develops a framework to address this issue. Emphatically, the choice of appropriate tool is a major determinant of failure or success in waste or delay control or elimination (Schweikhart & Dembe, 2009; Li, 2011; Anvari & Sorooshian, 2014).

Also, the study contributes in several ways to construction project delay control research. From the literature analysis: the study has developed a systematic framework to identify and categorize delay sources in construction projects. In spite of the numerous studies conducted on delays in construction projects, there is a lack of consensus about delay sources and its groupings (Norzima et al., 2011; Sorooshian, 2014). However, this research has analyzed and grouped delay sources based on shared characteristics. The groupings are made up of 4Ps and PESTLE for internal and external delay sources respectively. Given this framework, would increase awareness and understanding, provide valuable insights and build consensus among researchers and stakeholders on the delay sources and its' category.

Furthermore, the study has included 4Ps and PESTLE as the outcome of the construction project delays. These concepts are important in construction project delay in order to understand the main root of where the delays emanate. Therefore, this assessment is a direct contribution to the theory as it investigates the factors that cause delays in projects. Additionally, previous studies also suggested that there is a need for identification and understanding of the sources of delays in order to achieve better project performance (Sorooshian, 2014).

More also, studies only on lean tools concentrated on the lean application, lean principles or concepts, and barriers that prevent lean implementation. There is a noticeable absence of knowledge with respect to lean tools adoption and effectiveness in Malaysian construction industry. This thesis enriches the existing body of knowledge in the light of lean construction tools. It ranks lean tools based on their effect on controlling delays in Malaysian construction projects. Also, the constructs of the model of this research have not been investigated before in an integrated model. Thus, the research framework has contributed to knowledge development as the constructs and their relationship has never been the subject of prior theorizing in an integrated construction project delay model. The data in the study were analyzed using AHP decision-making modeling because it is suitable for making and explaining complex decision making (Tayfun & Uyan, 2013). Thus, the application of MCDM-AHP decision modeling in this study has made it possible to extend the theoretical contribution.

This study contributes by giving a better understanding of lean management tools adoption. Specifically, the geographical location of the study was in Malaysia, an Asian and a developing country which contributes to the originality of the study. Furthermore, very few studies on lean adoption have been conducted in developing countries, specifically in Malaysia. However, most of the past research on the lean tools application have been concentrated in developed countries, especially in the United Kingdom (Koskela et al., 2013). The location provided empirical evidence that supports the applicability of culture that differs greatly from developed countries and western countries cultural context such as the United Kingdom. In this regard, the current study reinforced that the country location influences the ways the experts evaluate the lean tools to control delays. Thus, this study developed and validated lean tool-delay control model in a new setting. The work of Whetten (1989) indicated that one of the practices in advancing theory development is by conducting a study in a new setting and this process facilitates the improvement of the instruments. Consequently, lean tool-delay control research expands into a new research frontier that will bring fascinating new perspectives to the project performance. Hence, the current study provides a theoretical contribution by integrating appropriate constructs to form model.

5.4.2 Contribution to Methodology

This study describes in detail the methodology of modeling using MCDM-AHP to show why this study was different from other studies. This study is one of the recent and pragmatic efforts to conceptualize and validate the integrated delay control model through lean tools using AHP in the context of Malaysian construction projects. The application of AHP makes it possible to extend the theoretical contribution of the study by developing and testing the two models developed in this study. The study confirms that the AHP model has adequately established the consistency and validity of the overall research model.

Using AHP modeling in estimating the research model, with about forty alternatives in contrast to various constraints and some requirements for measurement scale of indicators, relatively high numbers of constructs and complexities including pair to pair comparisons, weightings, synthesis, lambda max approximation, consistency indices analysis, among others, are made possible through AHP decision-making modelling. Moreover, the direct objective of this study was to further develop the framework based on experts' ranking of the constructs. Thus, in the current study, AHP is considered an appropriate methodological decision as compared to other MCDM approaches for a number of reasons (Alam et al., 2012). Hence, this study contributes to advance on complex decision-making modeling in construction project delay control by estimating the alternatives of the models. The current study strengthens the robustness of AHP analysis to quantify and estimate experts' preferences in the research models. The study provided step-by-step processes on how to analyze the model and the steps suggested by Alam et al. (2012) and Tayfun & Uyan (2013) were followed. The study finally computed the goodness of the results to calculate the consistency index (CI) and consistency ratio (CR) of the research model. Through the use of the assessment techniques, the study contributes to the advancement of construction project delay control research through AHP modeling application to the models. Consequently, the study confirms that its methodology contributes to the further development of delay control research, specifically in the construction research context.

5.4.3 Contribution to Industry

The results of this research provide important implications for construction companies, government, construction management, practitioners and all the stakeholders involved in the construction industry. The findings indicate an evaluation of the overall level of delay sources including project scope, project management, project participant and procurement level (4Ps), and political, economic, social, technological, legal and environmental levels (PESTLE). Construction management teams would be interested in the findings of this study as it gives practitioners a better understanding of how lean tools control project delays. Being able to know how effective and suitable a tool is crucial to managers. In particular, these findings suggest that managers of construction companies should focus attention on improving the delivery processes and be keen to the sources that seek to impede on project performance and the available lean tools to control such specific delay sources. The overall delay control framework is a combination of two models that seek to reduce or eliminate project delays in both the internal and external environment of construction projects. The findings suggest that managers could improve project delivery performance through the deployment of these robust, yet, emerging lean tools in the context of Malaysian construction industry. For instance, project management delay sources could be controlled by lean tools including Last Planner System (LPS), Concurrent Engineering and Daily Huddle Meetings. Similarly, the political delay sources could be controlled by Concurrent Engineering, Last Planner System (LPS) and Value Stream Mapping.

Based on the findings of this research, managers can increase project delivery performance through the identification of the main sources of delays (Sorooshian, 2014) provided in this research and selection of suitable and effective lean tools to control specific delays (Li, 2011; Anvari et al., 2014). Thus, having a good understanding of the constructs of the research models is important for managers to evaluate and implement robust delay control tools in their companies. This is because the current practices of project management have deficiencies in delivering projects on time, however, lean tools have been considered as robust delay control tool and its adoption by managers ensure enormous benefits for the Malaysian construction industry (Muhammad et al., 2013; Nikakhtar et al., 2015).

The model developed in this study offers managers with an understanding of how an individual delay source could be mitigated with some specific lean tools. Henceforth, the findings of overall proposed delay identification and control models will facilitate a new lean construction paradigm. Also, the findings extend the scope of delay identification research for practitioners in Malaysia by developing a generalized framework for identifying and grouping delay sources through a conceptual-based framework. The implications of the research are highly relevant to practitioners, especially in developing countries. In summary, the findings on the lean tool-delay control would help practitioners to build up robust project delivery systems in developing countries by facilitating continuous process improvement and advancing evidence-based practice to allow operative decisions in the industry.

5.5 Limitations

The study attempted to elaborate the understanding of the constructs in the research models. Even though this proves to be worthwhile, nevertheless, it was not without limiting factors. The following curbs are of great significance:

Firstly, the study was carried out within a specific research domain of the construction industry and in top 10 Malaysian construction companies, which is as recognized as contractors with knowledge and experience in lean management upon consultation with Construction Industrial Development Board (CIDB). This does limit the robustness of the results. Even though delays and lean tools adoption are specific to the context, the results may differ when evaluating another Grade of companies or other construction companies. As a result, replications of this study in other contexts would build up robustness in the research models.

Also, the research models for this study may not be as all-inclusive as it could have been. The models relied on a number of pre-identified conceptual constructs. Consequently, these constructs could only explain a portion of the lean tools and perceived delay sources and in the outcome. There may be other constructs which, are not part of this study, yet, may have a substantial impact on construction project delay control.

Again, even though the experience and expertise of the experts were found to be relatively ok, using a different set of experts with more experience could give different results. This differences may affect the reliability of the results obtained from the survey.

More also, the experts' familiarity with the lean tools could not be conclusive as 40 lean tools may be too broad for them to truly understand and answer. Besides, they may not have applied some of the tools before and therefore could not evidently know their effectiveness. The experts may also feel confused with too many tools to analyze. All these could affect the reliability and may contribute to biases of the results.

Furthermore, from the research results, it was observed that both Model I and Model II were influenced by the same three alternatives (lean tools) namely; Last Planner System (LPS), Concurrent Engineering and Daily Huddle Meetings. This could explain its frequent use in the construction industry as indicated by researchers (Koskela, 2013; Marhani et al., 2013; Sarhan & Fox, 2013; Rahman et al., 2012; Aziz & Hafez, 2013; Muhammad et al., 2013; Nikakhtar et al., 2015), however, this may have been influenced by the experts' familiarity with the tools and therefore may yield biases in their judgement.

Finally, the findings of this study are likely to have relevance to other construction project settings in Malaysia, where culture, conditions, and challenges of delay and lean tools may be similar. However, there is a limitation regarding the generalizability of findings to other project settings. There might be divergent preferences of the lean tools for delay control based on expertise or individualistic preferences.

5.6 Recommendations

With reference to aforementioned information; the findings, literature review support and the limitations of the study, the following areas are highlighted for future research interest to extend the existing body of knowledge and practice on lean tool adoption for delay control:

This study has been carried out to examine and control delays in the construction industry, future work could investigate the present study in different settings. Specifically, how lean tools could be applied in other construction companies such as Construction companies with Grade 6 registration, Grade 5 registration, among others, would be stimulating research area to pursue. Yet, the researcher must confirm whether or not such companies practice lean. Likewise, in order to understand the theoretical structure more thoroughly, the theoretical building developed in this study can be applied to other contexts of study such as other industries. Nonetheless, some notice of caution is key, such as consistency in instrument development and validation. It is advised that the researcher carries out a qualitative interview process or preliminary analysis of the constructs to refine the proposed measurement instruments. The results from such a study might improve the overall reliability and robustness of delay control model(s).

Future studies could compare the experiences of lean tool delay control project setting using two distinctive groups of experts. Such a comparative analysis would reveal some interesting findings. The results can be compared. Thereby, any intervention arranges to improve project delay would be with great acceptance. Also, this will help to understand the significant differences (if any) between the results obtained from different groups or even other settings. Hence, this could be employed for explaining different sets of experts and the findings from the study may add to the overall generalizability of delay control model.

5.7 Conclusion

The objective of this research was to investigate delay sources in the construction project and develop delay control framework based on lean tools adoption. The study focused on the impact of the lean tools on the Malaysian construction industry. There are two main sources of delays evaluated in this study including 4Ps and PESTLE. However, forty lean tools were selected and ranked on each of the delay sources. Based on the literature on delays and lean tools, two main research models were developed (Model I & Model II). The research models were specified as an AHP decision-based models, which was then tested through a semi-structured interview. The study utilized MCDM-AHP for modeling and analyzing the research models and analyzed the preferences made by the experts. The findings of the research model confirmed Last Planner System (LPS), Concurrent Engineering and Daily Huddle Meetings as being the most effective lean-delay control tools for Model I (4Ps). Meanwhile, the least influenced lean tools are found to be Preventive Maintenance, SMART Goals, and Multi-Process Handling. Even so, Model II (PESTLE) found Concurrent Engineering, Last Planner System (LPS) and Daily Huddle Meetings as having a strong influence. Meanwhile, the least influenced lean tools are found to be Total Productive Maintenance (TPM), Preventive Maintenance and SMART Goals for Model II.

The most significant contribution of the study is by ranking the lean tools on delay sources in Malaysian construction industry. The research models show internal consistency, rigor, and robust findings. Overall, the thesis has significant theoretical, methodological and practical implications. In general, the findings of this study would feasible and robust for knowledge and practice of delay control as it provides an important step and practical solutions through the adoption of the lean tool to control delays, especially in Malaysia.

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APPENDIX A

MODEL I: PAIRWISE COMPARISON AND NORMALIZATION MATRICES

Criteria 1 Matrix (Project Scope)

Project Scope	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
A1	1.00	0.50	1.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00
A2	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00
A3	1.00	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00
A4	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00
A5	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A6	3.00	2.00	2.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00
A7	0.13	0.20	0.17	0.25	0.17	0.13	1.00	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17
A8	0.33	0.20	0.14	0.25	0.20	0.14	2.00	1.00	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20
A9	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	1.00	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25
A10	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20
A11	0.33	0.33	0.20	0.20	0.20	0.13	2.00	1.00	1.00	2.00	1.00	6.00	5.00	5.00	5.00	0.33	0.33	0.20	0.20	0.20
A12	0.20	0.25	0.20	0.20	0.20	0.14	0.17	0.20	0.20	0.25	0.17	1.00	1.00	1.00	1.00	0.20	0.25	0.20	0.20	0.20
A13	0.17	0.25	0.17	0.20	0.20	0.14	0.20	0.20	0.20	0.20	0.20	1.00	1.00	1.00	1.00	0.17	0.25	0.17	0.20	0.20
A14	0.20	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	0.33	0.20	1.00	1.00	1.00	0.33	0.20	0.20	0.20	0.25	0.20
A15	0.20	0.25	0.20	0.33	0.20	0.14	0.20	0.17	0.20	0.20	0.20	1.00	1.00	3.00	1.00	0.20	0.25	0.20	0.33	0.20
A16	1.00	0.50	1.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00
A17	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00
A18	1.00	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00
A19	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00
A20	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A21	3.00	2.00	2.00	2.00	2.00	2.00	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00
A22	0.13	0.20	0.17	0.25	0.17	0.13	0.50	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17
A23	0.33	0.20	0.14	0.25	0.20	0.14	2.00	2.00	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20
A24	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	0.50	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25
A25	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20
A26	0.33	0.33	0.20	0.20	0.20	0.13	2.00	1.00	1.00	2.00	1.00	6.00	5.00	5.00	5.00	0.33	0.33	0.20	0.20	0.20
A27	0.20	0.25	0.20	0.20	0.20	0.14	0.17	0.20	0.20	0.25	0.17	1.00	1.00	1.00	1.00	0.20	0.25	0.20	0.20	0.20
A28	0.17	0.25	0.17	0.20	0.20	0.14	0.20	0.20	0.20	0.20	0.20	1.00	1.00	1.00	1.00	0.17	0.25	0.17	0.20	0.20
A29	0.20	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	0.33	0.20	1.00	1.00	1.00	0.33	0.20	0.20	0.20	0.25	0.20
A30	0.20	0.25	0.20	0.33	0.20	0.14	0.20	0.17	0.20	0.20	0.20	1.00	1.00	3.00	1.00	0.20	0.25	0.20	0.33	0.20
A31	1.00	0.50	1.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00
A32	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00
A33	1.00	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00
A34	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00
A35	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A36	3.00	2.00	2.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00
A37	0.13	0.20	0.17	0.25	0.17	0.13	1.00	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17
A38	0.33	0.20	0.14	0.25	0.20	0.14	2.00	1.00	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20
A39	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	1.00	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25
A40	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20
TOTAL	34.77	28.37	20.46	27.72	28.45	14.00	130.97	106.53	100.53	119.97	99.53	173.00	177.00	175.00	166.67	34.77	28.37	20.46	27.72	28.45

Project Scope	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
A1	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00
A2	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00
A3	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00
A4	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00
A5	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00
A6	0.50	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00
A7	0.13	2.00	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17	0.13	1.00	0.50	1.00	1.00
A8	0.14	2.00	0.50	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20	0.14	2.00	1.00	1.00	2.00
A9	0.14	1.00	1.00	2.00	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	1.00	2.00
A10	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00
A11	0.13	2.00	1.00	1.00	2.00	1.00	6.00	5.00	5.00	5.00	0.33	0.33	0.20	0.20	0.20	0.13	2.00	1.00	1.00	2.00
A12	0.14	0.17	0.20	0.20	0.25	0.17	1.00	1.00	1.00	1.00	0.20	0.25	0.20	0.20	0.20	0.14	0.17	0.20	0.20	0.25
A13	0.14	0.20	0.20	0.20	0.20	0.20	1.00	1.00	1.00	1.00	0.17	0.25	0.17	0.20	0.20	0.14	0.20	0.20	0.20	0.20
A14	0.14	0.17	0.20	0.17	0.33	0.20	1.00	1.00	1.00	0.33	0.20	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	0.33
A15	0.14	0.20	0.17	0.20	0.20	0.20	1.00	1.00	3.00	1.00	0.20	0.25	0.20	0.33	0.20	0.14	0.20	0.17	0.20	0.20
A16	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00
A17	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00
A18	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00
A19	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00
A20	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00
A21	1.00	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00
A22	0.13	1.00	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17	0.13	1.00	0.50	1.00	1.00
A23	0.14	2.00	1.00	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20	0.14	2.00	1.00	1.00	2.00
A24	0.14	1.00	1.00	1.00	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	1.00	2.00
A25	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00
A26	0.13	2.00	1.00	1.00	2.00	1.00	6.00	5.00	5.00	5.00	0.33	0.33	0.20	0.20	0.20	0.13	2.00	1.00	1.00	2.00
A27	0.14	0.17	0.20	0.20	0.25	0.17	1.00	1.00	1.00	1.00	0.20	0.25	0.20	0.20	0.20	0.14	0.17	0.20	0.20	0.25
A28	0.14	0.20	0.20	0.20	0.20	0.20	1.00	1.00	1.00	1.00	0.17	0.25	0.17	0.20	0.20	0.14	0.20	0.20	0.20	0.20
A29	0.14	0.17	0.20	0.17	0.33	0.20	1.00	1.00	1.00	0.33	0.20	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	0.33
A30	0.14	0.20	0.17	0.20	0.20	0.20	1.00	1.00	3.00	1.00	0.20	0.25	0.20	0.33	0.20	0.14	0.20	0.17	0.20	0.20
A31	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00
A32	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00
A33	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00
A34	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00
A35	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00
A36	1.00	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00
A37	0.13	1.00	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17	0.13	1.00	0.50	1.00	1.00
A38	0.14	2.00	1.00	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20	0.14	2.00	1.00	1.00	2.00
A39	0.14	1.00	1.00	1.00	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	1.00	2.00
A40	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00
TOTAL	12.50	132.47	105.03	102.03	119.97	99.53	173.00	177.00	175.00	166.67	34.77	28.37	20.46	27.72	28.45	13.00	131.47	105.53	101.03	119.97

Criteria 1 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.03	0.02	0.05	0.02	0.04	0.02	0.06	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.05	0.02	0.04	0.03	0.06	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.05	0.02	0.04	0.03	0.06	0.03	0.05	0.04	1.37	0.034130
A2	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	1.38	0.034413
A3	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	1.97	0.049187
A4	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	0.05	0.03	0.03	0.02	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	0.05	0.03	0.03	0.02	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	1.43	0.035723
A5	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	1.45	0.036185
A6	0.09	0.07	0.10	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.08	0.04	0.04	0.04	0.04	0.09	0.07	0.10	0.07	0.07	0.04	0.06	0.07	0.07	0.07	0.08	0.04	0.04	0.04	0.04	0.09	0.07	0.10	0.07	0.07	0.08	0.06	0.07	0.07	0.07	2.65	0.066316
A7	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.49	0.012330
A8	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.01	0.02	0.01	0.03	0.03	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.56	0.014101
A9	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.58	0.014470
A10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.43	0.010708
A11	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.58	0.014533
A12	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.22	0.005492
A13	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.21	0.005302
A14	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.21	0.005339
A15	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.26	0.006405
A16	0.03	0.02	0.05	0.02	0.04	0.02	0.06	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.05	0.02	0.04	0.03	0.06	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.05	0.02	0.04	0.03	0.06	0.03	0.05	0.04	1.37	0.034130
A17	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	1.38	0.034413
A18	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	1.97	0.049187
A19	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	0.05	0.03	0.03	0.02	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	0.05	0.03	0.03	0.02	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	1.43	0.035723
A20	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	1.45	0.036185
A21	0.09	0.07	0.10	0.07	0.07	0.14	0.06	0.07	0.07	0.07	0.08	0.04	0.04	0.04	0.04	0.09	0.07	0.10	0.07	0.07	0.08	0.06	0.07	0.07	0.07	0.08	0.04	0.04	0.04	0.04	0.09	0.07	0.10	0.07	0.07	0.08	0.06	0.07	0.07	0.07	2.76	0.069101
A22	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.48	0.012046
A23	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.03	0.03	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.58	0.014454
A24	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.56	0.014101
A25	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.43	0.010708
A26	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.58	0.014533
A27	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.22	0.005492
A28	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.21	0.005302
A29	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.21	0.005339
A30	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.26	0.006405
A31	0.03	0.02	0.05	0.02	0.04	0.02	0.06	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.05	0.02	0.04	0.03	0.06	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.05	0.02	0.04	0.03	0.06	0.03	0.05	0.04	1.37	0.034130
A32	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.04	0.05	0.02	0.04	1.38	0.034413
A33	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.05	0.07	0.07	0.04	0.05	0.07	0.06	0.04	1.97	0.049187
A34	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	0.05	0.03	0.03	0.02	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	0.05	0.03	0.03	0.02	0.02	0.06	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.05	0.03	1.43	0.035723
A35	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.05	0.04	0.04	1.45	0.036185
A36	0.09	0.07	0.10	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.08	0.04	0.04	0.04	0.04	0.09	0.07	0.10	0.07	0.07	0.08	0.06	0.07	0.07	0.07	0.08	0.04	0.04	0.04	0.04	0.09	0.07	0.10	0.07	0.07	0.08	0.06	0.07	0.07	0.07	2.69	0.067316
A37	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.49	0.012142
A38	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.57	0.014220
A39	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.57	0.014225
A40	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.43	0.010708
TOTAL	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		

Criteria 2 Matrix (Project Management)

Project Managt.	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
A1	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00
A2	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00
A3	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00
A4	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A5	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00
A6	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00
A7	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20
A8	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17
A9	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20
A10	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17
A11	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20
A12	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20
A13	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17
A14	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17
A15	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17
A16	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00
A17	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00
A18	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00
A19	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A20	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00
A21	3.00	2.00	3.00	3.00	3.00	2.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00
A22	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20
A23	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17
A24	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20
A25	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17
A26	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20
A27	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20
A28	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17
A29	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17
A30	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17
A31	0.50	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00
A32	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00
A33	0.50	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00
A34	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A35	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00
A36	3.00	2.00	3.00	3.00	3.00	0.50	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00
A37	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20
A38	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17
A39	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20
A40	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17
TOTAL	31.67	28.08	23.20	32.53	31.00	12.08	128.45	125.45	94.23	142.73	80.85	173.00	205.00	174.00	190.67	32.67	28.08	23.20	32.53	31.00

Project Managt.	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39
A1	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	2.00	0.50	2.00	1.00	1.00	0.33	6.00	6.00	2.00
A2	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00
A3	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00
A4	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00
A5	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00
A6	0.50	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	2.00	7.00	7.00	8.00
A7	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00
A8	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00
A9	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00
A10	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20
A11	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00
A12	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25
A13	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17
A14	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20
A15	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20
A16	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00
A17	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00
A18	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00
A19	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00
A20	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00
A21	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	3.00	7.00	7.00	8.00
A22	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00
A23	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00
A24	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00
A25	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20
A26	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00
A27	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25
A28	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17
A29	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20
A30	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20
A31	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00
A32	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00
A33	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00
A34	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00
A35	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00
A36	0.33	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00
A37	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00
A38	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00
A39	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00
A40	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20
TOTAL	10.41	128.45	125.45	94.23	142.73	80.85	173.00	205.00	174.00	190.67	33.67	28.08	24.20	32.53	31.00	14.58	128.45	125.45	94.23

Criteria 2 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.03	0.02	0.04	0.03	0.03	0.03	0.05	0.05	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.03	0.05	0.05	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.06	0.02	0.08	0.03	0.03	0.02	0.05	0.05	0.02	0.03	1.34	0.033594
A2	0.06	0.04	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.01	0.02	0.03	0.02	0.03	0.04	0.06	0.04	0.02	0.03	0.03	0.05	0.05	0.04	0.05	0.01	0.02	0.03	0.02	0.03	0.04	0.06	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.05	0.01	1.44	0.035925
A3	0.03	0.07	0.04	0.06	0.06	0.03	0.04	0.06	0.05	0.04	0.07	0.03	0.04	0.03	0.03	0.03	0.07	0.04	0.06	0.06	0.03	0.04	0.06	0.05	0.04	0.07	0.03	0.04	0.03	0.03	0.03	0.07	0.04	0.06	0.06	0.02	0.04	0.06	0.05	0.04	1.91	0.047848
A4	0.03	0.04	0.02	0.03	0.03	0.03	0.05	0.05	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.05	0.05	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.04	1.28	0.032122
A5	0.03	0.04	0.02	0.03	0.03	0.03	0.04	0.05	0.05	0.04	0.06	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.04	0.05	0.05	0.04	0.06	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.02	0.04	0.05	0.05	0.04	1.45	0.036286
A6	0.09	0.07	0.13	0.09	0.10	0.08	0.05	0.06	0.08	0.05	0.07	0.05	0.04	0.03	0.04	0.09	0.07	0.13	0.09	0.10	0.05	0.05	0.06	0.08	0.05	0.07	0.05	0.04	0.03	0.04	0.09	0.07	0.12	0.09	0.10	0.14	0.05	0.06	0.08	0.05	2.91	0.072787
A7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.02	0.03	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.49	0.012255
A8	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.56	0.014021
A9	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.61	0.015321
A10	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.36	0.009040
A11	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.04	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.04	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.68	0.016968
A12	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.24	0.005941
A13	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.18	0.004382
A14	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.20	0.004965
A15	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.21	0.005199
A16	0.03	0.02	0.04	0.03	0.03	0.03	0.05	0.05	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.03	0.05	0.05	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.02	0.05	0.05	0.02	0.03	1.27	0.031818
A17	0.06	0.04	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.01	0.02	0.03	0.02	0.03	0.04	0.06	0.04	0.02	0.03	0.03	0.05	0.05	0.04	0.05	0.01	0.02	0.03	0.02	0.03	0.04	0.06	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.05	0.01	1.44	0.035925
A18	0.03	0.07	0.04	0.06	0.06	0.03	0.04	0.06	0.05	0.04	0.07	0.03	0.04	0.03	0.03	0.03	0.07	0.04	0.06	0.06	0.03	0.04	0.06	0.05	0.04	0.07	0.03	0.04	0.03	0.03	0.03	0.07	0.04	0.06	0.06	0.02	0.04	0.06	0.05	0.04	1.91	0.047848
A19	0.03	0.04	0.02	0.03	0.03	0.03	0.05	0.05	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.05	0.05	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.04	1.28	0.032122
A20	0.03	0.04	0.02	0.03	0.03	0.03	0.04	0.05	0.05	0.04	0.06	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.04	0.05	0.05	0.04	0.06	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.02	0.04	0.05	0.05	0.04	1.45	0.036286
A21	0.09	0.07	0.13	0.09	0.10	0.17	0.05	0.06	0.08	0.05	0.07	0.05	0.04	0.03	0.04	0.09	0.07	0.13	0.09	0.10	0.10	0.05	0.06	0.08	0.05	0.07	0.05	0.04	0.03	0.04	0.09	0.07	0.12	0.09	0.10	0.21	0.05	0.06	0.08	0.05	3.11	0.077772
A22	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.02	0.03	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.49	0.012255
A23	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.56	0.014021
A24	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.61	0.015321
A25	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.36	0.009040
A26	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.04	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.04	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.68	0.016968
A27	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.24	0.005941
A28	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.18	0.004382
A29	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.20	0.004965
A30	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.21	0.005199
A31	0.02	0.02	0.04	0.03	0.03	0.03	0.05	0.05	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.03	0.05	0.05	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.02	0.05	0.05	0.02	0.03	1.26	0.031423
A32	0.06	0.04	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.01	0.02	0.03	0.02	0.03	0.04	0.06	0.04	0.02	0.03	0.03	0.05	0.05	0.04	0.05	0.01	0.02	0.03	0.02	0.03	0.04	0.06	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.05	0.01	1.44	0.035925
A33	0.02	0.07	0.04	0.06	0.06	0.03	0.04	0.06	0.05	0.04	0.07	0.03	0.04	0.03	0.03	0.03	0.07	0.04	0.06	0.06	0.03	0.04	0.06	0.05	0.04	0.07	0.03	0.04	0.03	0.03	0.03	0.07	0.04	0.06	0.06	0.02	0.04	0.06	0.05	0.04	1.90	0.047453
A34	0.03	0.04	0.02	0.03	0.03	0.03	0.05	0.05	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.05	0.05	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.04	1.28	0.032122
A35	0.03	0.04	0.02	0.03	0.03	0.03	0.04	0.05	0.05	0.04	0.06	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.04	0.05	0.05	0.04	0.06	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.02	0.04	0.05	0.05	0.04	1.45	0.036286
A36	0.09	0.07	0.13	0.09	0.10	0.04	0.05	0.06	0.08	0.05	0.07	0.05	0.04	0.03	0.04	0.09	0.07	0.13	0.09	0.10	0.03	0.05	0.06	0.08	0.05	0.07	0.05	0.04	0.03	0.04	0.09	0.07	0.12	0.09	0.10	0.07	0.05	0.06	0.08	0.05	2.79	0.069636
A37	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.02	0.03	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.49	0.012255
A38	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.56	0.014021
A39	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.61	0.015321
A40	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.36	0.009040
TOTAL	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		

Criteria 3 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vecto
A1	0.06	0.12	0.07	0.04	0.12	0.08	0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.03	0.03	0.11	0.12	0.07	0.04	0.12	0.07	0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.03	0.03	0.03	0.12	0.07	0.04	0.12	0.06	0.05	0.03	0.04	0.05	**2.26**	0.056398
A2	0.01	0.02	0.03	0.04	0.02	0.03	0.05	0.04	0.05	0.02	0.03	0.04	0.02	0.03	0.03	0.01	0.02	0.03	0.04	0.02	0.02	0.05	0.04	0.05	0.02	0.03	0.04	0.02	0.03	0.03	0.01	0.02	0.03	0.04	0.02	0.02	0.05	0.04	0.05	0.02	**1.27**	0.031689
A3	0.03	0.02	0.03	0.04	0.05	0.03	0.04	0.06	0.05	0.05	0.06	0.05	0.03	0.03	0.03	0.03	0.02	0.03	0.04	0.05	0.02	0.04	0.06	0.05	0.05	0.06	0.05	0.03	0.03	0.03	0.03	0.02	0.03	0.04	0.05	0.02	0.04	0.06	0.05	0.05	**1.58**	0.039429
A4	0.06	0.02	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.04	0.05	0.06	0.02	0.03	0.03	0.06	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.05	0.04	0.05	0.06	0.02	0.03	0.03	0.06	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.05	0.04	**1.54**	0.038554
A5	0.01	0.02	0.02	0.04	0.02	0.04	0.05	0.04	0.04	0.05	0.06	0.04	0.03	0.03	0.02	0.01	0.02	0.02	0.04	0.02	0.03	0.05	0.04	0.04	0.05	0.06	0.04	0.03	0.03	0.02	0.01	0.02	0.02	0.04	0.02	0.03	0.05	0.04	0.04	0.05	**1.35**	0.033770
A6	0.06	0.07	0.10	0.08	0.05	0.08	0.06	0.06	0.06	0.06	0.07	0.06	0.04	0.04	0.03	0.06	0.07	0.10	0.08	0.05	0.14	0.06	0.06	0.06	0.06	0.07	0.06	0.04	0.04	0.03	0.06	0.07	0.10	0.08	0.05	0.13	0.06	0.06	0.06	0.06	**2.65**	0.066287
A7	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	**0.50**	0.012393
A8	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	**0.41**	0.010219
A9	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	**0.47**	0.011688
A10	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	**0.34**	0.008543
A11	0.03	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.02	**0.61**	0.015338
A12	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	**0.47**	0.011680
A13	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.18**	0.004439
A14	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.19**	0.004740
A15	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.18**	0.004447
A16	0.03	0.12	0.07	0.04	0.12	0.08	0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.03	0.03	0.06	0.12	0.07	0.04	0.12	0.07	0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.03	0.03	0.06	0.12	0.07	0.04	0.12	0.06	0.05	0.03	0.04	0.05	**2.20**	0.055032
A17	0.01	0.02	0.03	0.04	0.02	0.03	0.05	0.04	0.05	0.02	0.03	0.04	0.02	0.03	0.03	0.01	0.02	0.03	0.04	0.02	0.02	0.05	0.04	0.05	0.02	0.03	0.04	0.02	0.03	0.03	0.01	0.02	0.03	0.04	0.02	0.02	0.05	0.04	0.05	0.02	**1.27**	0.031689
A18	0.03	0.02	0.03	0.04	0.05	0.03	0.04	0.06	0.05	0.05	0.06	0.05	0.03	0.03	0.03	0.03	0.02	0.03	0.04	0.05	0.02	0.04	0.06	0.05	0.05	0.06	0.05	0.03	0.03	0.03	0.03	0.02	0.03	0.04	0.05	0.02	0.04	0.06	0.05	0.05	**1.58**	0.039429
A19	0.06	0.02	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.04	0.05	0.06	0.02	0.03	0.03	0.06	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.05	0.04	0.05	0.06	0.02	0.03	0.03	0.06	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.05	0.04	**1.54**	0.038554
A20	0.01	0.02	0.02	0.04	0.02	0.04	0.05	0.04	0.04	0.05	0.06	0.04	0.03	0.03	0.02	0.01	0.02	0.02	0.04	0.02	0.03	0.05	0.04	0.04	0.05	0.06	0.04	0.03	0.03	0.02	0.01	0.02	0.02	0.04	0.02	0.03	0.05	0.04	0.04	0.05	**1.35**	0.033770
A21	0.06	0.07	0.10	0.08	0.05	0.04	0.06	0.06	0.06	0.06	0.07	0.06	0.04	0.04	0.03	0.06	0.07	0.10	0.08	0.05	0.07	0.06	0.06	0.06	0.06	0.07	0.06	0.04	0.04	0.03	0.06	0.07	0.10	0.08	0.05	0.13	0.06	0.06	0.07	0.06	**2.55**	0.063798
A22	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	**0.50**	0.012393
A23	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	**0.41**	0.010219
A24	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	**0.47**	0.011688
A25	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	**0.34**	0.008543
A26	0.03	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.02	**0.61**	0.015338
A27	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	**0.47**	0.011680
A28	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.18**	0.004439
A29	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.19**	0.004740
A30	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.18**	0.004447
A31	0.12	0.12	0.07	0.04	0.12	0.08	0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.03	0.03	0.06	0.12	0.07	0.04	0.12	0.07	0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.03	0.03	0.06	0.12	0.07	0.04	0.12	0.06	0.05	0.03	0.04	0.05	**2.29**	0.057210
A32	0.01	0.02	0.03	0.04	0.02	0.03	0.05	0.04	0.05	0.02	0.03	0.04	0.02	0.03	0.03	0.01	0.02	0.03	0.04	0.02	0.02	0.05	0.04	0.05	0.02	0.03	0.04	0.02	0.03	0.03	0.01	0.02	0.03	0.04	0.02	0.02	0.05	0.04	0.05	0.02	**1.27**	0.031689
A33	0.03	0.02	0.03	0.04	0.05	0.03	0.04	0.06	0.05	0.05	0.06	0.05	0.03	0.03	0.03	0.03	0.02	0.03	0.04	0.05	0.02	0.04	0.06	0.05	0.05	0.06	0.05	0.03	0.03	0.03	0.03	0.02	0.03	0.04	0.05	0.02	0.04	0.06	0.05	0.05	**1.58**	0.039429
A34	0.06	0.02	0.03	0.04	0.02	0.04	0.04	0.04	0.05	0.04	0.05	0.06	0.02	0.03	0.03	0.06	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.05	0.04	0.05	0.06	0.02	0.03	0.03	0.06	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.05	0.04	**1.54**	0.038554
A35	0.01	0.02	0.02	0.04	0.02	0.04	0.05	0.04	0.04	0.05	0.06	0.04	0.03	0.03	0.02	0.01	0.02	0.02	0.04	0.02	0.03	0.05	0.04	0.04	0.05	0.06	0.04	0.03	0.03	0.02	0.01	0.02	0.02	0.04	0.02	0.03	0.05	0.04	0.04	0.05	**1.35**	0.033770
A36	0.06	0.07	0.10	0.08	0.05	0.04	0.06	0.06	0.06	0.06	0.07	0.06	0.04	0.04	0.03	0.06	0.07	0.10	0.08	0.05	0.03	0.06	0.06	0.06	0.06	0.07	0.06	0.04	0.04	0.03	0.06	0.07	0.10	0.08	0.05	0.06	0.06	0.06	0.06	0.06	**2.45**	0.061161
A37	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.02	**0.50**	0.012393
A38	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	**0.41**	0.010219
A39	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	**0.47**	0.011657
A40	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	**0.34**	0.008543
TOTAI	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**		

Criteria 4 Matrix (Procurement)

Procurement	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
A1	1.00	1.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	2.00	2.00	1.00	0.33	1.00
A2	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00
A3	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00
A4	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00
A5	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00
A6	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00
A7	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20
A8	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20
A9	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20
A10	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20
A11	0.17	0.50	0.50	0.17	0.20	0.14	1.00	2.00	2.00	2.00	1.00	1.00	4.00	5.00	5.00	0.17	0.50	0.50	0.17	0.20
A12	0.20	0.17	0.50	0.25	0.20	0.13	3.00	3.00	3.00	1.00	1.00	1.00	5.00	5.00	4.00	0.20	0.17	0.50	0.25	0.20
A13	0.25	0.20	0.17	0.20	0.17	0.13	0.20	0.20	1.00	0.20	0.25	0.20	1.00	0.50	1.00	0.25	0.20	0.17	0.20	0.17
A14	0.20	0.17	0.33	0.20	0.17	0.17	0.25	0.20	4.00	3.00	0.20	0.20	2.00	1.00	4.00	0.20	0.17	0.33	0.20	0.17
A15	0.17	0.17	0.20	0.20	0.20	0.13	0.20	0.20	1.00	0.20	0.20	0.25	1.00	0.25	1.00	0.17	0.17	0.20	0.20	0.20
A16	0.50	1.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	1.00	1.00	0.33	1.00
A17	0.50	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00
A18	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00
A19	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00
A20	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00
A21	3.00	2.00	2.00	3.00	2.00	0.50	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00
A22	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20
A23	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20
A24	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20
A25	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20
A26	0.17	0.50	0.50	0.17	0.20	0.14	1.00	2.00	2.00	2.00	1.00	1.00	4.00	5.00	5.00	0.17	0.50	0.50	0.17	0.20
A27	0.20	0.17	0.50	0.25	0.20	0.13	3.00	3.00	3.00	1.00	1.00	1.00	5.00	5.00	4.00	0.20	0.17	0.50	0.25	0.20
A28	0.25	0.20	0.17	0.20	0.17	0.13	0.20	0.20	1.00	0.20	0.25	0.20	1.00	0.50	1.00	0.25	0.20	0.17	0.20	0.17
A29	0.20	0.17	0.33	0.20	0.17	0.17	0.25	0.20	4.00	3.00	0.20	0.20	2.00	1.00	4.00	0.20	0.17	0.33	0.20	0.17
A30	0.17	0.17	0.20	0.20	0.20	0.13	0.20	0.20	1.00	0.20	0.20	0.25	1.00	0.25	1.00	0.17	0.17	0.20	0.20	0.20
A31	1.00	1.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	1.00	1.00	0.33	1.00
A32	0.50	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00
A33	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00
A34	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00
A35	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00
A36	3.00	2.00	2.00	3.00	2.00	0.33	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00
A37	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20
A38	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20
A39	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20
A40	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20
TOTAL	33.42	19.45	38.85	35.88	28.27	11.36	112.80	104.80	163.00	125.30	96.80	101.30	176.00	145.25	183.00	35.92	20.45	38.85	35.88	28.27

Procurement	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
A1	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	2.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00
A2	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00
A3	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00
A4	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00
A5	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00	3.00	5.00	5.00	5.00	5.00
A6	2.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.00
A7	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00
A8	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00
A9	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50
A10	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00
A11	0.14	1.00	2.00	2.00	2.00	1.00	1.00	4.00	5.00	5.00	0.17	0.50	0.50	0.17	0.20	0.14	1.00	2.00	2.00	2.00
A12	0.13	3.00	3.00	3.00	1.00	1.00	1.00	5.00	5.00	4.00	0.20	0.17	0.50	0.25	0.20	0.13	3.00	3.00	3.00	1.00
A13	0.13	0.20	0.20	1.00	0.20	0.25	0.20	1.00	0.50	1.00	0.25	0.20	0.17	0.20	0.17	0.13	0.20	0.20	1.00	0.20
A14	0.17	0.25	0.20	4.00	3.00	0.20	0.20	2.00	1.00	4.00	0.20	0.17	0.33	0.20	0.17	0.17	0.25	0.20	4.00	3.00
A15	0.13	0.20	0.20	1.00	0.20	0.20	0.25	1.00	0.25	1.00	0.17	0.17	0.20	0.20	0.20	0.13	0.20	0.20	1.00	0.20
A16	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	1.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00
A17	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00
A18	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00
A19	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00
A20	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00
A21	1.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00	2.00	7.00	7.00	8.00	7.00
A22	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00
A23	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00
A24	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50
A25	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00
A26	0.14	1.00	2.00	2.00	2.00	1.00	1.00	4.00	5.00	5.00	0.17	0.50	0.50	0.17	0.20	0.14	1.00	2.00	2.00	2.00
A27	0.13	3.00	3.00	3.00	1.00	1.00	1.00	5.00	5.00	4.00	0.20	0.17	0.50	0.25	0.20	0.13	3.00	3.00	3.00	1.00
A28	0.13	0.20	0.20	1.00	0.20	0.25	0.20	1.00	0.50	1.00	0.25	0.20	0.17	0.20	0.17	0.13	0.20	0.20	1.00	0.20
A29	0.17	0.25	0.20	4.00	3.00	0.20	0.20	2.00	1.00	4.00	0.20	0.17	0.33	0.20	0.17	0.17	0.25	0.20	4.00	3.00
A30	0.13	0.20	0.20	1.00	0.20	0.20	0.25	1.00	0.25	1.00	0.17	0.17	0.20	0.20	0.20	0.13	0.20	0.20	1.00	0.20
A31	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	1.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00
A32	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00
A33	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00
A34	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00
A35	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00
A36	0.50	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.00
A37	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00
A38	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00
A39	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50
A40	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00
TOTAL	13.03	112.80	104.80	163.00	125.30	96.80	101.30	176.00	145.25	183.00	34.92	20.45	38.85	35.88	28.27	16.03	112.80	104.80	163.00	125.30

Criteria 4 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
A1	0.03	0.05	0.03	0.01	0.04	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.06	0.10	0.03	0.01	0.04
A2	0.03	0.05	0.13	0.11	0.07	0.04	0.04	0.05	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.05	0.13	0.11	0.07
A3	0.03	0.01	0.03	0.03	0.04	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.04
A4	0.09	0.01	0.03	0.03	0.04	0.03	0.04	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.08	0.01	0.03	0.03	0.04
A5	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.04
A6	0.09	0.10	0.05	0.08	0.07	0.09	0.06	0.07	0.05	0.06	0.07	0.08	0.05	0.04	0.04	0.08	0.10	0.05	0.08	0.07
A7	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01
A8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01
A9	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01
A10	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01
A11	0.00	0.03	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.00	0.02	0.01	0.00	0.01
A12	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01
A13	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01
A14	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
A15	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01
A16	0.01	0.05	0.03	0.01	0.04	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.03	0.05	0.03	0.01	0.04
A17	0.01	0.05	0.13	0.11	0.07	0.04	0.04	0.05	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.05	0.13	0.11	0.07
A18	0.03	0.01	0.03	0.03	0.04	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.04
A19	0.09	0.01	0.03	0.03	0.04	0.03	0.04	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.08	0.01	0.03	0.03	0.04
A20	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.04
A21	0.09	0.10	0.05	0.08	0.07	0.04	0.06	0.07	0.05	0.06	0.07	0.08	0.05	0.04	0.04	0.08	0.10	0.05	0.08	0.07
A22	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01
A23	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01
A24	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01
A25	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01
A26	0.00	0.03	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.00	0.02	0.01	0.00	0.01
A27	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01
A28	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01
A29	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
A30	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01
A31	0.03	0.05	0.03	0.01	0.04	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.03	0.05	0.03	0.01	0.04
A32	0.01	0.05	0.13	0.11	0.07	0.04	0.04	0.05	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.05	0.13	0.11	0.07
A33	0.03	0.01	0.03	0.03	0.04	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.04
A34	0.09	0.01	0.03	0.03	0.04	0.03	0.04	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.08	0.01	0.03	0.03	0.04
A35	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.04
A36	0.09	0.10	0.05	0.08	0.07	0.03	0.06	0.07	0.05	0.06	0.07	0.08	0.05	0.04	0.04	0.08	0.10	0.05	0.08	0.07
A37	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01
A38	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01
A39	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01
A40	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01
TOTAL	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.03	0.10	0.03	0.01	0.04	0.02	0.04	0.04	0.03	0.02	**1.46**	0.036552
A2	0.04	0.04	0.05	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.05	0.13	0.11	0.07	0.03	0.04	0.05	0.04	0.05	**2.18**	0.054424
A3	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.04	0.03	0.05	0.04	0.03	0.04	**1.23**	0.030688
A4	0.03	0.04	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.09	0.01	0.03	0.03	0.04	0.02	0.04	0.03	0.04	0.04	**1.44**	0.036121
A5	0.04	0.04	0.05	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.04	0.19	0.04	0.05	0.03	0.04	**1.59**	0.039820
A6	0.15	0.06	0.07	0.05	0.06	0.07	0.08	0.05	0.04	0.04	0.09	0.10	0.05	0.08	0.07	0.06	0.06	0.07	0.05	0.06	**2.74**	0.068599
A7	0.01	0.01	0.01	0.02	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	**0.55**	0.013824
A8	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	**0.52**	0.013018
A9	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	**0.21**	0.005164
A10	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.38**	0.009542
A11	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	**0.57**	0.014328
A12	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.01	**0.61**	0.015147
A13	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.20**	0.004991
A14	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.02	**0.39**	0.009657
A15	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.19**	0.004752
A16	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.03	0.05	0.03	0.01	0.04	0.02	0.04	0.04	0.03	0.02	**1.32**	0.033037
A17	0.04	0.04	0.05	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.05	0.13	0.11	0.07	0.03	0.04	0.05	0.04	0.05	**2.16**	0.054050
A18	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.04	0.03	0.05	0.04	0.03	0.04	**1.23**	0.030688
A19	0.03	0.04	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.09	0.01	0.03	0.03	0.04	0.02	0.04	0.03	0.04	0.04	**1.44**	0.036121
A20	0.04	0.04	0.05	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.04	0.03	0.04	0.05	0.03	0.04	**1.44**	0.035921
A21	0.08	0.06	0.07	0.05	0.06	0.07	0.08	0.05	0.04	0.04	0.09	0.10	0.05	0.08	0.07	0.12	0.06	0.07	0.05	0.06	**2.69**	0.067140
A22	0.01	0.01	0.01	0.02	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	**0.55**	0.013824
A23	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	**0.52**	0.013018
A24	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	**0.21**	0.005164
A25	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.38**	0.009542
A26	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.02	**0.57**	0.014328
A27	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.01	**0.61**	0.015147
A28	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.20**	0.004991
A29	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.02	**0.39**	0.009657
A30	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.19**	0.004752
A31	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.03	0.05	0.03	0.01	0.04	0.02	0.04	0.04	0.03	0.02	**1.34**	0.033411
A32	0.04	0.04	0.05	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.05	0.13	0.11	0.07	0.03	0.04	0.05	0.04	0.05	**2.16**	0.054050
A33	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.04	0.03	0.05	0.04	0.03	0.04	**1.23**	0.030688
A34	0.03	0.04	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.09	0.01	0.03	0.03	0.04	0.02	0.04	0.03	0.04	0.04	**1.44**	0.036121
A35	0.04	0.04	0.05	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.04	0.03	0.04	0.05	0.03	0.04	**1.44**	0.035921
A36	0.04	0.06	0.07	0.05	0.06	0.07	0.08	0.05	0.04	0.04	0.09	0.10	0.05	0.08	0.07	0.06	0.06	0.07	0.05	0.06	**2.57**	0.064254
A37	0.01	0.01	0.01	0.02	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	**0.55**	0.013824
A38	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	**0.52**	0.013018
A39	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	**0.21**	0.005164
A40	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.38**	0.009542
TOTAL	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		

APPENDIX B

MODEL II: PAIRWISE COMPARISON AND NORMALIZATION MATRICES

Criteria 1 Matrix (Political)

Political	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
A1	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	2.00	0.50	2.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00
A2	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00
A3	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00
A4	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00
A5	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00
A6	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	0.50	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	2.00	7.00	7.00	8.00	7.00
A7	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00
A8	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00
A9	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00
A10	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00
A11	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00
A12	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00
A13	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17
A14	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50
A15	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20
A16	1.00	4.00	4.00	4.00	4.00	1.00	6.00	2.00	6.00	5.00	5.00	3.00	7.00	9.00	6.00	1.00	4.00	4.00	4.00	4.00	1.00	6.00	2.00	6.00	5.00	5.00	3.00	7.00	9.00	6.00	1.00	4.00	4.00	4.00	4.00	1.00	6.00	2.00	6.00	5.00
A17	0.33	1.00	1.00	2.00	2.00	0.50	6.00	5.00	4.00	6.00	2.00	6.00	5.00	5.00	5.00	0.25	1.00	1.00	2.00	2.00	0.50	6.00	5.00	4.00	6.00	2.00	6.00	5.00	5.00	5.00	0.25	1.00	1.00	2.00	2.00	0.50	6.00	5.00	4.00	6.00
A18	0.25	1.00	1.00	1.00	1.00	0.33	2.00	2.00	2.00	4.00	0.50	4.00	5.00	5.00	4.00	0.25	1.00	1.00	1.00	1.00	0.33	2.00	2.00	2.00	4.00	0.50	4.00	5.00	5.00	4.00	0.25	1.00	1.00	1.00	1.00	0.33	2.00	2.00	2.00	4.00
A19	0.25	0.50	1.00	1.00	1.00	1.00	5.00	5.00	5.00	4.00	1.00	5.00	4.00	5.00	5.00	0.25	0.50	1.00	1.00	1.00	1.00	5.00	5.00	5.00	4.00	1.00	5.00	4.00	5.00	5.00	0.25	0.50	1.00	1.00	1.00	1.00	5.00	5.00	5.00	4.00
A20	0.25	0.50	1.00	1.00	1.00	0.33	4.00	2.00	5.00	5.00	1.00	6.00	5.00	8.00	5.00	0.25	0.50	1.00	1.00	1.00	0.33	4.00	2.00	5.00	5.00	1.00	6.00	5.00	8.00	5.00	0.25	0.50	1.00	1.00	1.00	0.33	4.00	2.00	5.00	5.00
A21	1.00	2.00	3.00	1.00	3.00	1.00	7.00	8.00	7.00	7.00	2.00	8.00	7.00	8.00	8.00	1.00	2.00	3.00	1.00	3.00	1.00	7.00	8.00	7.00	7.00	2.00	8.00	7.00	8.00	8.00	1.00	2.00	3.00	1.00	3.00	1.00	7.00	8.00	7.00	7.00
A22	0.17	0.17	0.50	0.20	0.25	0.14	1.00	1.00	2.00	6.00	1.00	6.00	6.00	6.00	6.00	0.17	0.17	0.50	0.20	0.25	0.14	1.00	1.00	2.00	6.00	1.00	6.00	6.00	6.00	6.00	0.17	0.17	0.50	0.20	0.25	0.14	1.00	1.00	2.00	6.00
A23	0.50	0.20	0.50	0.20	0.50	0.13	1.00	1.00	1.00	4.00	0.50	4.00	5.00	6.00	6.00	0.50	0.20	0.50	0.20	0.50	0.13	1.00	1.00	1.00	4.00	0.50	4.00	5.00	6.00	6.00	0.50	0.20	0.50	0.20	0.50	0.13	1.00	1.00	1.00	4.00
A24	0.17	0.25	0.50	0.20	0.20	0.14	0.50	1.00	1.00	5.00	0.50	4.00	6.00	6.00	5.00	0.17	0.25	0.50	0.20	0.20	0.14	0.50	1.00	1.00	5.00	0.50	4.00	6.00	6.00	5.00	0.17	0.25	0.50	0.20	0.20	0.14	0.50	1.00	1.00	5.00
A25	0.20	0.17	0.25	0.25	0.20	0.14	0.17	0.25	0.20	1.00	0.50	1.00	1.00	4.00	2.00	0.20	0.17	0.25	0.25	0.20	0.14	0.17	0.25	0.20	1.00	0.50	1.00	1.00	4.00	2.00	0.20	0.17	0.25	0.25	0.20	0.14	0.17	0.25	0.20	1.00
A26	0.20	0.50	2.00	1.00	1.00	0.50	1.00	2.00	2.00	2.00	1.00	6.00	5.00	6.00	5.00	0.20	0.50	2.00	1.00	1.00	0.50	1.00	2.00	2.00	2.00	1.00	6.00	5.00	6.00	5.00	0.20	0.50	2.00	1.00	1.00	0.50	1.00	2.00	2.00	2.00
A27	0.33	0.17	0.25	0.20	0.17	0.13	0.17	0.25	0.25	1.00	0.17	1.00	4.00	6.00	4.00	0.33	0.17	0.25	0.20	0.17	0.13	0.17	0.25	0.25	1.00	0.17	1.00	4.00	6.00	4.00	0.33	0.17	0.25	0.20	0.17	0.13	0.17	0.25	0.25	1.00
A28	0.14	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	1.00	0.20	0.25	1.00	2.00	2.00	0.14	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	1.00	0.20	0.25	1.00	2.00	2.00	0.14	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	1.00
A29	0.11	0.20	0.20	0.20	0.13	0.13	0.17	0.17	0.17	0.25	0.17	0.17	0.50	1.00	1.00	0.11	0.20	0.20	0.20	0.13	0.13	0.17	0.17	0.17	0.25	0.17	0.17	0.50	1.00	1.00	0.11	0.20	0.20	0.20	0.13	0.13	0.17	0.17	0.17	0.25
A30	0.17	0.20	0.25	0.20	0.20	0.13	0.17	0.17	0.20	0.50	0.20	0.25	0.50	1.00	1.00	0.17	0.20	0.25	0.20	0.20	0.13	0.17	0.17	0.20	0.50	0.20	0.25	0.50	1.00	1.00	0.17	0.20	0.25	0.20	0.20	0.13	0.17	0.17	0.20	0.50
A31	1.00	4.00	4.00	4.00	4.00	1.00	6.00	2.00	6.00	5.00	5.00	3.00	7.00	9.00	6.00	1.00	4.00	4.00	4.00	4.00	1.00	6.00	2.00	6.00	5.00	5.00	3.00	7.00	9.00	6.00	1.00	4.00	4.00	4.00	4.00	1.00	6.00	2.00	6.00	5.00
A32	0.25	1.00	1.00	2.00	2.00	0.50	6.00	5.00	4.00	6.00	2.00	6.00	5.00	5.00	5.00	0.25	1.00	1.00	2.00	2.00	0.50	6.00	5.00	4.00	6.00	2.00	6.00	5.00	5.00	5.00	0.25	1.00	1.00	2.00	2.00	0.50	6.00	5.00	4.00	6.00
A33	0.25	1.00	1.00	1.00	1.00	0.33	2.00	2.00	2.00	4.00	0.50	4.00	5.00	5.00	4.00	0.25	1.00	1.00	1.00	1.00	0.33	2.00	2.00	2.00	4.00	0.50	4.00	5.00	5.00	4.00	0.25	1.00	1.00	1.00	1.00	0.33	2.00	2.00	2.00	4.00
A34	0.25	0.50	1.00	1.00	1.00	1.00	5.00	5.00	5.00	4.00	1.00	5.00	4.00	5.00	5.00	0.25	0.50	1.00	1.00	1.00	1.00	5.00	5.00	5.00	4.00	1.00	5.00	4.00	5.00	5.00	0.25	0.50	1.00	1.00	1.00	1.00	5.00	5.00	5.00	4.00
A35	0.25	0.50	1.00	1.00	1.00	0.33	4.00	2.00	5.00	5.00	1.00	6.00	5.00	8.00	5.00	0.25	0.50	1.00	1.00	1.00	0.33	4.00	2.00	5.00	5.00	1.00	6.00	5.00	8.00	5.00	0.25	0.50	1.00	1.00	1.00	0.33	4.00	2.00	5.00	5.00
A36	1.00	2.00	3.00	1.00	3.00	1.00	7.00	8.00	7.00	7.00	2.00	8.00	7.00	8.00	8.00	1.00	2.00	3.00	1.00	3.00	1.00	7.00	8.00	7.00	7.00	2.00	8.00	7.00	8.00	8.00	1.00	2.00	3.00	1.00	3.00	1.00	7.00	8.00	7.00	7.00
A37	0.17	0.17	0.50	0.20	0.25	0.14	1.00	1.00	2.00	6.00	1.00	6.00	6.00	6.00	6.00	0.17	0.17	0.50	0.20	0.25	0.14	1.00	1.00	2.00	6.00	1.00	6.00	6.00	6.00	6.00	0.17	0.17	0.50	0.20	0.25	0.14	1.00	1.00	2.00	6.00
A38	0.50	0.20	0.50	0.20	0.50	0.13	1.00	1.00	1.00	4.00	0.50	4.00	5.00	6.00	6.00	0.50	0.20	0.50	0.20	0.50	0.13	1.00	1.00	1.00	4.00	0.50	4.00	5.00	6.00	6.00	0.50	0.20	0.50	0.20	0.50	0.13	1.00	1.00	1.00	4.00
A39	0.17	0.25	0.50	0.20	0.20	0.14	0.50	1.00	1.00	5.00	0.50	4.00	6.00	6.00	5.00	0.17	0.25	0.50	0.20	0.20	0.14	0.50	1.00	1.00	5.00	0.50	4.00	6.00	6.00	5.00	0.17	0.25	0.50	0.20	0.20	0.14	0.50	1.00	1.00	5.00
A40	0.20	0.17	0.25	0.25	0.20	0.14	0.17	0.25	0.20	1.00	0.50	1.00	1.00	4.00	2.00	0.20	0.17	0.25	0.25	0.20	0.14	0.17	0.25	0.20	1.00	0.50	1.00	1.00	4.00	2.00	0.20	0.17	0.25	0.25	0.20	0.14	0.17	0.25	0.20	1.00
TOTAL	20.40	30.59	36.40	34.82	38.63	14.55	111.10	99.72	101.20	147.62	57.24	162.17	185.00	202.00	184.33	20.31	30.59	36.40	34.82	38.63	14.05	111.10	99.72	101.20	147.62	57.24	162.17	185.00	202.00	184.33	21.31	30.59	37.40	34.82	38.63	15.55	111.10	99.72	101.20	147.62

Criteria 1 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.05	0.02	0.03	0.03	0.03	0.02	0.05	0.06	0.02	0.03	0.03	0.04	0.04	0.02	0.03	0.05	0.02	0.03	0.03	0.03	0.02	0.05	0.06	0.02	0.03	0.03	0.04	0.04	0.02	0.03	0.09	0.02	0.05	0.03	0.03	0.02	0.05	0.06	0.02	0.03	1.39	0.034696
A2	0.10	0.03	0.01	0.03	0.03	0.03	0.05	0.05	0.05	0.01	0.03	0.04	0.03	0.02	0.04	0.10	0.03	0.01	0.03	0.03	0.04	0.05	0.05	0.05	0.01	0.03	0.04	0.03	0.02	0.04	0.09	0.03	0.01	0.03	0.03	0.03	0.05	0.05	0.05	0.01	1.53	0.038268
A3	0.05	0.07	0.03	0.06	0.05	0.02	0.05	0.08	0.05	0.04	0.10	0.04	0.05	0.03	0.03	0.05	0.07	0.03	0.06	0.05	0.02	0.05	0.08	0.05	0.04	0.10	0.04	0.05	0.03	0.03	0.05	0.07	0.03	0.06	0.05	0.02	0.05	0.08	0.05	0.04	1.96	0.048979
A4	0.05	0.03	0.01	0.03	0.03	0.02	0.05	0.06	0.02	0.04	0.03	0.04	0.03	0.02	0.03	0.05	0.03	0.01	0.03	0.03	0.02	0.05	0.06	0.02	0.04	0.03	0.04	0.03	0.02	0.03	0.05	0.03	0.01	0.03	0.03	0.02	0.05	0.06	0.02	0.04	1.34	0.033535
A5	0.05	0.03	0.01	0.03	0.03	0.02	0.05	0.06	0.05	0.04	0.09	0.03	0.03	0.03	0.03	0.05	0.03	0.01	0.03	0.03	0.02	0.05	0.06	0.05	0.04	0.09	0.03	0.03	0.03	0.03	0.05	0.03	0.01	0.03	0.03	0.02	0.05	0.06	0.05	0.04	1.53	0.038185
A6	0.15	0.07	0.08	0.09	0.08	0.07	0.06	0.07	0.08	0.05	0.10	0.05	0.04	0.03	0.04	0.15	0.07	0.08	0.09	0.08	0.04	0.06	0.07	0.08	0.05	0.10	0.05	0.04	0.03	0.04	0.14	0.07	0.08	0.09	0.08	0.13	0.06	0.07	0.08	0.05	2.92	0.073027
A7	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.48	0.012104
A8	0.01	0.01	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.03	0.02	0.03	0.02	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.03	0.02	0.03	0.02	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.03	0.58	0.014403
A9	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.03	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.63	0.015848
A10	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.36	0.009116
A11	0.02	0.02	0.00	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.02	0.04	0.03	0.02	0.04	0.02	0.02	0.00	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.02	0.04	0.03	0.02	0.04	0.02	0.02	0.00	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.71	0.017713
A12	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.23	0.005750
A13	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.17	0.004248
A14	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.19	0.004786
A15	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.20	0.004965
A16	0.05	0.13	0.11	0.11	0.10	0.07	0.05	0.02	0.06	0.03	0.09	0.02	0.04	0.04	0.03	0.05	0.13	0.11	0.11	0.10	0.07	0.05	0.02	0.06	0.03	0.09	0.02	0.04	0.04	0.03	0.05	0.13	0.11	0.11	0.10	0.06	0.05	0.02	0.06	0.03	2.67	0.066672
A17	0.02	0.03	0.03	0.06	0.05	0.03	0.05	0.05	0.04	0.04	0.03	0.04	0.03	0.02	0.03	0.01	0.03	0.03	0.06	0.05	0.04	0.05	0.05	0.04	0.04	0.03	0.04	0.03	0.02	0.03	0.01	0.03	0.03	0.06	0.05	0.03	0.05	0.05	0.04	0.04	1.50	0.037613
A18	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.03	0.02	0.02	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.03	0.02	0.02	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.92	0.022911
A19	0.01	0.02	0.03	0.03	0.03	0.07	0.05	0.05	0.05	0.03	0.02	0.03	0.02	0.02	0.03	0.01	0.02	0.03	0.03	0.03	0.07	0.05	0.05	0.05	0.03	0.02	0.03	0.02	0.02	0.03	0.01	0.02	0.03	0.03	0.03	0.06	0.05	0.05	0.05	0.03	1.29	0.032339
A20	0.01	0.02	0.03	0.03	0.03	0.02	0.04	0.02	0.05	0.03	0.02	0.04	0.03	0.04	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.04	0.02	0.05	0.03	0.02	0.04	0.03	0.04	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.04	0.02	0.05	0.03	1.11	0.027834
A21	0.05	0.07	0.08	0.03	0.08	0.07	0.06	0.08	0.07	0.05	0.03	0.05	0.04	0.04	0.04	0.05	0.07	0.08	0.03	0.08	0.07	0.06	0.08	0.07	0.05	0.03	0.05	0.04	0.04	0.04	0.05	0.07	0.08	0.03	0.08	0.06	0.06	0.08	0.07	0.05	2.30	0.057484
A22	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.02	0.04	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.02	0.04	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.68	0.017095
A23	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.63	0.015700
A24	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.57	0.014291
A25	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.27	0.006806
A26	0.01	0.02	0.05	0.03	0.03	0.03	0.01	0.02	0.02	0.01	0.02	0.04	0.03	0.03	0.03	0.01	0.02	0.05	0.03	0.03	0.04	0.01	0.02	0.02	0.01	0.02	0.04	0.03	0.03	0.03	0.01	0.02	0.05	0.03	0.03	0.03	0.01	0.02	0.02	0.01	0.97	0.024277
A27	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.34	0.008620
A28	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.22	0.005527
A29	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.16	0.003953
A30	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.18	0.004609
A31	0.05	0.13	0.11	0.11	0.10	0.07	0.05	0.02	0.06	0.03	0.09	0.02	0.04	0.04	0.03	0.05	0.13	0.11	0.11	0.10	0.07	0.05	0.02	0.06	0.03	0.09	0.02	0.04	0.04	0.03	0.05	0.13	0.11	0.11	0.10	0.06	0.05	0.02	0.06	0.03	2.67	0.066672
A32	0.01	0.03	0.03	0.06	0.05	0.03	0.05	0.05	0.04	0.04	0.03	0.04	0.03	0.02	0.03	0.01	0.03	0.03	0.06	0.05	0.04	0.05	0.05	0.04	0.04	0.03	0.04	0.03	0.02	0.03	0.01	0.03	0.03	0.06	0.05	0.03	0.05	0.05	0.04	0.04	1.50	0.037511
A33	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.03	0.02	0.02	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.03	0.02	0.02	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.92	0.022911
A34	0.01	0.02	0.03	0.03	0.03	0.07	0.05	0.05	0.05	0.03	0.02	0.03	0.02	0.02	0.03	0.01	0.02	0.03	0.03	0.03	0.07	0.05	0.05	0.05	0.03	0.02	0.03	0.02	0.02	0.03	0.01	0.02	0.03	0.03	0.03	0.06	0.05	0.05	0.05	0.03	1.29	0.032339
A35	0.01	0.02	0.03	0.03	0.03	0.02	0.04	0.02	0.05	0.03	0.02	0.04	0.03	0.04	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.04	0.02	0.05	0.03	0.02	0.04	0.03	0.04	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.04	0.02	0.05	0.03	1.11	0.027834
A36	0.05	0.07	0.08	0.03	0.08	0.07	0.06	0.08	0.07	0.05	0.03	0.05	0.04	0.04	0.04	0.05	0.07	0.08	0.03	0.08	0.07	0.06	0.08	0.07	0.05	0.03	0.05	0.04	0.04	0.04	0.05	0.07	0.08	0.03	0.08	0.06	0.06	0.08	0.07	0.05	2.30	0.057484
A37	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.02	0.04	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.02	0.04	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.68	0.017095
A38	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.63	0.015700
A39	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.01	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.57	0.014291
A40	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.27	0.006806

Criteria 2 Matrix (Economic)

Economic	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
A1	1.00	0.50	0.50	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	2.00	0.50	2.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00
A2	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00
A3	2.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00
A4	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00
A5	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00
A6	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	0.50	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	2.00	7.00	7.00	8.00	7.00
A7	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00
A8	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00
A9	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00
A10	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00
A11	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00
A12	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00
A13	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17
A14	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50
A15	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20
A16	1.00	0.50	0.50	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	2.00	0.50	2.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00
A17	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00
A18	2.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00
A19	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00
A20	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00
A21	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	2.00	7.00	7.00	8.00	7.00
A22	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00
A23	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00
A24	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00
A25	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00
A26	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00
A27	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00
A28	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17
A29	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50
A30	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20
A31	1.00	4.00	1.00	5.00	5.00	2.00	7.00	5.00	3.00	5.00	3.00	4.00	6.00	6.00	6.00	1.00	5.00	0.50	6.00	5.00	3.00	6.00	5.00	3.00	5.00	3.00	4.00	6.00	5.00	6.00	1.00	5.00	1.00	5.00	5.00	0.50	5.00	5.00	3.00	4.00
A32	0.20	1.00	1.00	1.00	1.00	0.50	5.00	5.00	5.00	1.00	3.00	5.00	5.00	5.00	3.00	0.20	1.00	1.00	1.00	1.00	0.50	5.00	5.00	5.00	1.00	3.00	5.00	5.00	5.00	3.00	0.20	1.00	1.00	1.00	1.00	0.50	5.00	5.00	5.00	1.00
A33	1.00	1.00	1.00	4.00	2.00	0.50	5.00	5.00	5.00	2.00	5.00	3.00	6.00	6.00	4.00	1.00	1.00	1.00	4.00	2.00	0.50	5.00	5.00	5.00	2.00	5.00	3.00	6.00	6.00	4.00	1.00	1.00	1.00	4.00	2.00	0.50	5.00	5.00	5.00	2.00
A34	0.17	1.00	0.25	1.00	1.00	0.33	2.00	6.00	2.00	2.00	6.00	5.00	5.00	5.00	6.00	0.17	1.00	0.25	1.00	1.00	0.33	2.00	6.00	2.00	2.00	6.00	5.00	5.00	5.00	6.00	0.17	1.00	0.25	1.00	1.00	0.33	2.00	6.00	2.00	2.00
A35	0.20	1.00	0.50	1.00	1.00	0.33	2.00	5.00	5.00	1.00	2.00	6.00	5.00	5.00	7.00	0.20	1.00	0.50	1.00	1.00	0.33	2.00	5.00	5.00	1.00	2.00	6.00	5.00	5.00	7.00	0.20	1.00	0.50	1.00	1.00	0.33	2.00	5.00	5.00	1.00
A36	2.00	2.00	2.00	3.00	3.00	1.00	6.00	6.00	6.00	8.00	7.00	7.00	8.00	7.00	7.00	2.00	2.00	2.00	3.00	3.00	0.50	6.00	6.00	6.00	8.00	7.00	7.00	8.00	7.00	7.00	1.00	2.00	2.00	3.00	3.00	1.00	6.00	6.00	6.00	8.00
A37	0.11	0.20	0.20	0.50	0.50	0.17	1.00	2.00	1.00	0.33	5.00	5.00	2.00	6.00	7.00	0.11	0.20	0.20	0.50	0.50	0.17	1.00	2.00	1.00	0.33	5.00	5.00	2.00	6.00	7.00	0.11	0.20	0.20	0.50	0.50	0.17	1.00	2.00	1.00	0.33
A38	0.20	0.20	0.20	0.17	0.20	0.17	0.50	1.00	1.00	1.00	1.00	0.50	4.00	5.00	6.00	0.20	0.20	0.20	0.17	0.20	0.17	0.50	1.00	1.00	1.00	1.00	0.50	4.00	5.00	6.00	0.20	0.20	0.20	0.17	0.20	0.17	0.50	1.00	1.00	1.00
A39	0.33	0.20	0.20	0.50	0.20	0.17	1.00	1.00	1.00	1.00	2.00	2.00	5.00	6.00	5.00	0.33	0.20	0.20	0.50	0.20	0.17	1.00	1.00	1.00	1.00	2.00	2.00	5.00	6.00	5.00	0.33	0.20	0.20	0.50	0.20	0.17	1.00	1.00	1.00	1.00
A40	0.20	1.00	0.50	0.50	1.00	0.13	3.00	1.00	1.00	1.00	6.00	5.00	5.00	4.00	5.00	0.20	1.00	0.50	0.50	1.00	0.13	3.00	1.00	1.00	1.00	6.00	5.00	5.00	4.00	5.00	0.20	1.00	0.50	0.50	1.00	0.13	3.00	1.00	1.00	1.00
TOTAL	30.00	31.12	21.86	39.20	36.17	13.48	120.70	121.87	94.03	120.07	95.02	163.50	195.00	179.00	190.67	28.00	32.12	22.36	40.20	36.17	13.48	119.70	121.87	94.03	120.07	95.02	163.50	195.00	178.00	190.67	29.00	32.12	24.86	39.20	36.17	13.98	118.70	121.87	94.03	119.07

Criteria 2 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.03	0.02	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.03	0.02	0.04	0.04	0.03	0.03	0.04	0.02	0.04	0.02	0.03	0.02	0.05	0.05	0.02	0.03	0.02	0.04	0.04	0.03	0.03	0.07	0.02	0.08	0.03	0.03	0.02	0.05	0.05	0.02	0.03	**1.32**	0.033083
A2	0.07	0.03	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.02	0.02	0.04	0.03	0.03	0.04	0.07	0.03	0.02	0.02	0.03	0.04	0.05	0.04	0.05	0.02	0.02	0.04	0.03	0.03	0.04	0.07	0.03	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.02	**1.43**	0.035636
A3	0.07	0.06	0.05	0.05	0.06	0.02	0.04	0.07	0.05	0.05	0.06	0.04	0.05	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.02	0.04	0.07	0.05	0.05	0.06	0.04	0.05	0.03	0.03	0.03	0.06	0.04	0.05	0.06	0.02	0.04	0.07	0.05	0.05	**1.89**	0.047279
A4	0.03	0.03	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.05	0.02	0.04	0.03	0.03	0.03	0.04	0.03	0.02	0.02	0.03	0.02	0.05	0.05	0.02	0.05	0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.05	**1.28**	0.032073
A5	0.03	0.03	0.02	0.03	0.03	0.02	0.04	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.04	0.03	0.02	0.02	0.03	0.02	0.04	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.04	0.05	0.05	0.05	**1.44**	0.035911
A6	0.10	0.06	0.14	0.08	0.08	0.07	0.06	0.06	0.09	0.06	0.06	0.05	0.04	0.03	0.04	0.11	0.06	0.13	0.07	0.08	0.04	0.06	0.06	0.09	0.06	0.06	0.05	0.04	0.03	0.04	0.10	0.06	0.12	0.08	0.08	0.14	0.06	0.06	0.09	0.06	**2.86**	0.071454
A7	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	**0.50**	0.012566
A8	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.01	0.03	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.01	0.03	0.01	0.01	0.03	**0.57**	0.014350
A9	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	**0.63**	0.015642
A10	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	**0.36**	0.008894
A11	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.04	0.03	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.04	0.03	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	**0.68**	0.016980
A12	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	**0.23**	0.005853
A13	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.17**	0.004173
A14	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.19**	0.004779
A15	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.20**	0.005030
A16	0.03	0.02	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.03	0.02	0.04	0.04	0.03	0.03	0.04	0.02	0.04	0.02	0.03	0.02	0.05	0.05	0.02	0.03	0.02	0.04	0.04	0.03	0.03	0.07	0.02	0.08	0.03	0.03	0.02	0.05	0.05	0.02	0.03	**1.32**	0.033083
A17	0.07	0.03	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.02	0.02	0.04	0.03	0.03	0.04	0.07	0.03	0.02	0.02	0.03	0.04	0.05	0.04	0.05	0.02	0.02	0.04	0.03	0.03	0.04	0.07	0.03	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.02	**1.43**	0.035636
A18	0.07	0.06	0.05	0.05	0.06	0.02	0.04	0.07	0.05	0.05	0.06	0.04	0.05	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.02	0.04	0.07	0.05	0.05	0.06	0.04	0.05	0.03	0.03	0.03	0.06	0.04	0.05	0.06	0.02	0.04	0.07	0.05	0.05	**1.89**	0.047279
A19	0.03	0.03	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.05	0.02	0.04	0.03	0.03	0.03	0.04	0.03	0.02	0.02	0.03	0.02	0.05	0.05	0.02	0.05	0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.05	0.05	0.02	0.05	**1.28**	0.032073
A20	0.03	0.03	0.02	0.03	0.03	0.02	0.04	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.04	0.03	0.02	0.02	0.03	0.02	0.04	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.04	0.05	0.05	0.05	**1.44**	0.035911
A21	0.10	0.06	0.14	0.08	0.08	0.07	0.06	0.06	0.09	0.06	0.06	0.05	0.04	0.03	0.04	0.11	0.06	0.13	0.07	0.08	0.07	0.06	0.06	0.09	0.06	0.06	0.05	0.04	0.03	0.04	0.10	0.06	0.12	0.08	0.08	0.14	0.06	0.06	0.09	0.06	**2.90**	0.072381
A22	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	**0.50**	0.012566
A23	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.01	0.03	0.01	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.01	0.03	0.01	0.01	0.03	**0.57**	0.014350
A24	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	**0.63**	0.015642
A25	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	**0.36**	0.008894
A26	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.04	0.03	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.04	0.03	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	**0.68**	0.016980
A27	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	**0.23**	0.005853
A28	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.17**	0.004173
A29	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.19**	0.004779
A30	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.20**	0.005030
A31	0.03	0.13	0.05	0.13	0.14	0.15	0.06	0.04	0.03	0.04	0.03	0.02	0.03	0.03	0.03	0.04	0.16	0.02	0.15	0.14	0.22	0.05	0.04	0.03	0.04	0.03	0.02	0.03	0.03	0.03	0.03	0.16	0.04	0.13	0.14	0.04	0.04	0.04	0.03	0.03	**2.66**	0.066540
A32	0.01	0.03	0.05	0.03	0.03	0.04	0.04	0.04	0.05	0.01	0.03	0.03	0.03	0.03	0.02	0.01	0.03	0.04	0.02	0.03	0.04	0.04	0.04	0.05	0.01	0.03	0.03	0.03	0.03	0.02	0.01	0.03	0.04	0.03	0.03	0.04	0.04	0.04	0.05	0.01	**1.21**	0.030267
A33	0.03	0.03	0.05	0.10	0.06	0.04	0.04	0.04	0.05	0.02	0.05	0.02	0.03	0.03	0.02	0.04	0.03	0.04	0.10	0.06	0.04	0.04	0.04	0.05	0.02	0.05	0.02	0.03	0.03	0.02	0.03	0.03	0.04	0.10	0.06	0.04	0.04	0.04	0.05	0.02	**1.68**	0.041970
A34	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.05	0.02	0.02	0.06	0.03	0.03	0.03	0.03	0.01	0.03	0.01	0.02	0.03	0.02	0.02	0.05	0.02	0.02	0.06	0.03	0.03	0.03	0.03	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.05	0.02	0.02	**1.05**	0.026148
A35	0.01	0.03	0.02	0.03	0.03	0.02	0.02	0.04	0.05	0.01	0.02	0.04	0.03	0.03	0.04	0.01	0.03	0.02	0.02	0.03	0.02	0.02	0.04	0.05	0.01	0.02	0.04	0.03	0.03	0.04	0.01	0.03	0.02	0.03	0.03	0.02	0.02	0.04	0.05	0.01	**1.07**	0.026666
A36	0.07	0.06	0.09	0.08	0.08	0.07	0.05	0.05	0.06	0.07	0.07	0.04	0.04	0.04	0.04	0.07	0.06	0.09	0.07	0.08	0.04	0.05	0.05	0.06	0.07	0.07	0.04	0.04	0.04	0.04	0.03	0.06	0.08	0.08	0.08	0.07	0.05	0.05	0.06	0.07	**2.44**	0.060975
A37	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.05	0.03	0.01	0.03	0.04	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.05	0.03	0.01	0.03	0.04	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00	**0.61**	0.015368
A38	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.03	0.03	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.03	0.03	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	**0.41**	0.010322
A39	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.51**	0.012872
A40	0.01	0.03	0.02	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.06	0.03	0.03	0.02	0.03	0.01	0.03	0.02	0.01	0.03	0.01	0.03	0.01	0.01	0.01	0.06	0.03	0.03	0.02	0.03	0.01	0.03	0.02	0.01	0.03	0.01	0.03	0.01	0.01	0.01	**0.82**	0.020541

Criteria 3 Matrix (Social)

Social	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
A1	1.00	0.50	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00
A2	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00
A3	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00
A4	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A5	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00
A6	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00
A7	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20
A8	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17
A9	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20
A10	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17
A11	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20
A12	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20
A13	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17
A14	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17
A15	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17
A16	1.00	5.00	1.00	2.00	2.00	0.50	7.00	6.00	6.00	3.00	7.00	4.00	6.00	6.00	7.00	1.00	5.00	1.00	2.00	2.00
A17	0.20	1.00	0.33	1.00	1.00	0.50	5.00	5.00	4.00	6.00	0.50	5.00	4.00	6.00	5.00	0.20	1.00	0.33	1.00	1.00
A18	1.00	3.00	1.00	2.00	2.00	0.33	5.00	5.00	6.00	3.00	5.00	5.00	9.00	6.00	6.00	1.00	3.00	1.00	2.00	2.00
A19	0.50	1.00	0.50	1.00	1.00	1.00	5.00	1.00	6.00	6.00	2.00	6.00	5.00	5.00	5.00	0.50	1.00	0.50	1.00	1.00
A20	0.50	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00	2.00	5.00	5.00	5.00	6.00	0.50	1.00	0.50	1.00	1.00
A21	2.00	2.00	3.00	1.00	2.00	1.00	6.00	7.00	8.00	8.00	8.00	8.00	8.00	7.00	7.00	2.00	2.00	3.00	1.00	2.00
A22	0.14	0.20	0.20	0.20	0.17	0.17	1.00	1.00	0.50	2.00	1.00	1.00	7.00	2.00	6.00	0.14	0.20	0.20	0.20	0.17
A23	0.17	0.20	0.20	1.00	0.20	0.14	1.00	1.00	1.00	2.00	1.00	2.00	6.00	3.00	5.00	0.17	0.20	0.20	1.00	0.20
A24	0.17	0.25	0.17	0.17	0.25	0.13	2.00	1.00	1.00	2.00	1.00	1.00	4.00	5.00	6.00	0.17	0.25	0.17	0.17	0.25
A25	0.33	0.17	0.33	0.17	0.20	0.13	0.50	0.50	0.50	1.00	1.00	1.00	3.00	0.50	5.00	0.33	0.17	0.33	0.17	0.20
A26	0.14	2.00	0.20	0.50	0.50	0.13	1.00	1.00	1.00	1.00	1.00	2.00	4.00	5.00	4.00	0.14	2.00	0.20	0.50	0.50
A27	0.25	0.20	0.20	0.17	0.20	0.13	1.00	0.50	1.00	1.00	0.50	1.00	6.00	5.00	6.00	0.25	0.20	0.20	0.17	0.20
A28	0.17	0.25	0.11	0.20	0.20	0.13	0.14	0.17	0.25	0.33	0.25	0.17	1.00	0.33	1.00	0.17	0.25	0.11	0.20	0.20
A29	0.17	0.17	0.17	0.20	0.20	0.14	0.50	0.33	0.20	2.00	0.20	0.20	3.00	1.00	4.00	0.17	0.17	0.17	0.20	0.20
A30	0.14	0.20	0.17	0.20	0.17	0.14	0.17	0.20	0.17	0.20	0.25	0.17	1.00	0.25	1.00	0.14	0.20	0.17	0.20	0.17
A31	1.00	5.00	1.00	2.00	2.00	0.50	7.00	6.00	6.00	3.00	7.00	4.00	6.00	6.00	7.00	1.00	5.00	1.00	2.00	2.00
A32	0.20	1.00	0.33	1.00	1.00	0.50	5.00	5.00	4.00	6.00	0.50	5.00	4.00	6.00	5.00	0.20	1.00	0.33	1.00	1.00
A33	1.00	3.00	1.00	2.00	2.00	0.33	5.00	5.00	6.00	3.00	5.00	5.00	9.00	6.00	6.00	1.00	3.00	1.00	2.00	2.00
A34	0.50	1.00	0.50	1.00	1.00	1.00	5.00	1.00	6.00	6.00	2.00	6.00	5.00	5.00	5.00	0.50	1.00	0.50	1.00	1.00
A35	0.50	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00	2.00	5.00	5.00	5.00	6.00	0.50	1.00	0.50	1.00	1.00
A36	2.00	2.00	3.00	1.00	2.00	1.00	6.00	7.00	8.00	8.00	8.00	8.00	8.00	7.00	7.00	2.00	2.00	3.00	1.00	2.00
A37	0.14	0.20	0.20	0.20	0.17	0.17	1.00	1.00	0.50	2.00	1.00	1.00	7.00	2.00	6.00	0.14	0.20	0.20	0.20	0.17
A38	0.17	0.20	0.20	1.00	0.20	0.14	1.00	1.00	1.00	2.00	1.00	2.00	6.00	3.00	5.00	0.17	0.20	0.20	1.00	0.20
A39	0.17	0.25	0.17	0.17	0.25	0.13	2.00	1.00	1.00	2.00	1.00	1.00	4.00	5.00	6.00	0.17	0.25	0.17	0.17	0.25
A40	0.33	0.17	0.33	0.17	0.20	0.13	0.50	0.50	0.50	1.00	1.00	1.00	3.00	0.50	5.00	0.33	0.17	0.33	0.17	0.20
TOTAL	24.18	40.21	23.31	31.60	31.53	13.54	123.91	109.63	108.63	129.40	86.71	140.03	201.00	164.58	199.33	24.18	40.21	23.31	31.60	31.53

Social	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
A1	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	2.00	0.50	2.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00
A2	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00
A3	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00
A4	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00
A5	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00
A6	0.50	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	2.00	7.00	7.00	8.00	7.00
A7	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00
A8	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00
A9	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00
A10	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00
A11	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00
A12	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00
A13	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17
A14	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50
A15	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20
A16	0.50	7.00	6.00	6.00	3.00	7.00	4.00	6.00	6.00	7.00	1.00	5.00	1.00	2.00	2.00	0.50	7.00	6.00	6.00	3.00
A17	0.50	5.00	5.00	4.00	6.00	0.50	5.00	4.00	6.00	5.00	0.20	1.00	0.33	1.00	1.00	0.50	5.00	5.00	4.00	6.00
A18	0.33	5.00	5.00	6.00	3.00	5.00	5.00	9.00	6.00	6.00	1.00	3.00	1.00	2.00	2.00	0.33	5.00	5.00	6.00	3.00
A19	1.00	5.00	1.00	6.00	6.00	2.00	6.00	5.00	5.00	5.00	0.50	1.00	0.50	1.00	1.00	1.00	5.00	1.00	6.00	6.00
A20	0.50	6.00	5.00	4.00	5.00	2.00	5.00	5.00	5.00	6.00	0.50	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00
A21	1.00	6.00	7.00	8.00	8.00	8.00	8.00	8.00	7.00	7.00	2.00	2.00	3.00	1.00	2.00	1.00	6.00	7.00	8.00	8.00
A22	0.17	1.00	1.00	0.50	2.00	1.00	1.00	7.00	2.00	6.00	0.14	0.20	0.20	0.20	0.17	0.17	1.00	1.00	0.50	2.00
A23	0.14	1.00	1.00	1.00	2.00	1.00	2.00	6.00	3.00	5.00	0.17	0.20	0.20	1.00	0.20	0.14	1.00	1.00	1.00	2.00
A24	0.13	2.00	1.00	1.00	2.00	1.00	1.00	4.00	5.00	6.00	0.17	0.25	0.17	0.17	0.25	0.13	2.00	1.00	1.00	2.00
A25	0.13	0.50	0.50	0.50	1.00	1.00	1.00	3.00	0.50	5.00	0.33	0.17	0.33	0.17	0.20	0.13	0.50	0.50	0.50	1.00
A26	0.13	1.00	1.00	1.00	1.00	1.00	2.00	4.00	5.00	4.00	0.14	2.00	0.20	0.50	0.50	0.13	1.00	1.00	1.00	1.00
A27	0.13	1.00	0.50	1.00	1.00	0.50	1.00	6.00	5.00	6.00	0.25	0.20	0.20	0.17	0.20	0.13	1.00	0.50	1.00	1.00
A28	0.13	0.14	0.17	0.25	0.33	0.25	0.17	1.00	0.33	1.00	0.17	0.25	0.11	0.20	0.20	0.13	0.14	0.17	0.25	0.33
A29	0.14	0.50	0.33	0.20	2.00	0.20	0.20	3.00	1.00	4.00	0.17	0.17	0.17	0.20	0.20	0.14	0.50	0.33	0.20	2.00
A30	0.14	0.17	0.20	0.17	0.20	0.25	0.17	1.00	0.25	1.00	0.14	0.20	0.17	0.20	0.17	0.14	0.17	0.20	0.17	0.20
A31	0.50	7.00	6.00	6.00	3.00	7.00	4.00	6.00	6.00	7.00	1.00	5.00	1.00	2.00	2.00	0.50	7.00	6.00	6.00	3.00
A32	0.50	5.00	5.00	4.00	6.00	0.50	5.00	4.00	6.00	5.00	0.20	1.00	0.33	1.00	1.00	0.50	5.00	5.00	4.00	6.00
A33	0.33	5.00	5.00	6.00	3.00	5.00	5.00	9.00	6.00	6.00	1.00	3.00	1.00	2.00	2.00	0.33	5.00	5.00	6.00	3.00
A34	1.00	5.00	1.00	6.00	6.00	2.00	6.00	5.00	5.00	5.00	0.50	1.00	0.50	1.00	1.00	1.00	5.00	1.00	6.00	6.00
A35	0.50	6.00	5.00	4.00	5.00	2.00	5.00	5.00	5.00	6.00	0.50	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00
A36	1.00	6.00	7.00	8.00	8.00	8.00	8.00	8.00	7.00	7.00	2.00	2.00	3.00	1.00	2.00	1.00	6.00	7.00	8.00	8.00
A37	0.17	1.00	1.00	0.50	2.00	1.00	1.00	7.00	2.00	6.00	0.14	0.20	0.20	0.20	0.17	0.17	1.00	1.00	0.50	2.00
A38	0.14	1.00	1.00	1.00	2.00	1.00	2.00	6.00	3.00	5.00	0.17	0.20	0.20	1.00	0.20	0.14	1.00	1.00	1.00	2.00
A39	0.13	2.00	1.00	1.00	2.00	1.00	1.00	4.00	5.00	6.00	0.17	0.25	0.17	0.17	0.25	0.13	2.00	1.00	1.00	2.00
A40	0.13	0.50	0.50	0.50	1.00	1.00	1.00	3.00	0.50	5.00	0.33	0.17	0.33	0.17	0.20	0.13	0.50	0.50	0.50	1.00
TOTAL	13.04	123.91	109.63	108.63	129.40	86.71	140.03	201.00	164.58	199.33	25.18	40.21	24.31	31.60	31.53	14.54	123.91	109.63	108.63	129.40

Criteria 4 Matrix (Technological)

Technological	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
A1	1.00	0.50	2.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00
A2	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00
A3	0.50	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00
A4	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00
A5	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A6	3.00	2.00	2.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00
A7	0.13	0.20	0.17	0.25	0.17	0.13	1.00	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17
A8	0.33	0.20	0.14	0.25	0.20	0.14	2.00	1.00	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20
A9	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	1.00	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25
A10	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20
A11	0.33	0.33	0.20	0.20	0.20	0.13	2.00	1.00	1.00	2.00	1.00	6.00	5.00	5.00	5.00	0.33	0.33	0.20	0.20	0.20
A12	0.20	0.25	0.20	0.20	0.20	0.14	0.17	0.20	0.20	0.25	0.17	1.00	1.00	1.00	1.00	0.20	0.25	0.20	0.20	0.20
A13	0.17	0.25	0.17	0.20	0.20	0.14	0.20	0.20	0.20	0.20	0.20	1.00	1.00	1.00	1.00	0.17	0.25	0.17	0.20	0.20
A14	0.20	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	0.33	0.20	1.00	1.00	1.00	0.33	0.20	0.20	0.20	0.25	0.20
A15	0.20	0.25	0.20	0.33	0.20	0.14	0.20	0.17	0.20	0.20	0.20	1.00	1.00	3.00	1.00	0.20	0.25	0.20	0.33	0.20
A16	1.00	2.00	0.50	1.00	6.00	0.50	5.00	5.00	5.00	2.00	5.00	5.00	5.00	3.00	5.00	1.00	2.00	0.50	1.00	6.00
A17	0.50	1.00	1.00	0.50	6.00	0.50	5.00	2.00	6.00	2.00	6.00	5.00	5.00	6.00	6.00	0.50	1.00	1.00	0.50	6.00
A18	2.00	1.00	1.00	1.00	5.00	0.50	5.00	2.00	5.00	5.00	5.00	4.00	5.00	5.00	6.00	2.00	1.00	1.00	1.00	5.00
A19	1.00	2.00	1.00	1.00	5.00	0.50	5.00	5.00	3.00	6.00	4.00	3.00	5.00	5.00	5.00	1.00	2.00	1.00	1.00	5.00
A20	0.17	0.17	0.20	0.20	1.00	0.50	1.00	1.00	6.00	0.50	4.00	5.00	5.00	2.00	5.00	0.17	0.17	0.20	0.20	1.00
A21	2.00	2.00	2.00	2.00	2.00	1.00	7.00	6.00	7.00	8.00	8.00	9.00	6.00	6.00	8.00	2.00	2.00	2.00	2.00	2.00
A22	0.20	0.20	0.20	0.20	1.00	0.14	1.00	0.33	2.00	1.00	5.00	5.00	2.00	5.00	4.00	0.20	0.20	0.20	0.20	1.00
A23	0.20	0.50	0.50	0.20	1.00	0.17	3.00	1.00	7.00	1.00	6.00	6.00	5.00	3.00	5.00	0.20	0.50	0.50	0.20	1.00
A24	0.20	0.17	0.20	0.33	0.17	0.14	0.50	0.14	1.00	1.00	5.00	0.50	1.00	1.00	5.00	0.20	0.17	0.20	0.33	0.17
A25	0.50	0.50	0.20	0.17	2.00	0.13	1.00	1.00	1.00	1.00	5.00	5.00	2.00	6.00	5.00	0.50	0.50	0.20	0.17	2.00
A26	0.20	0.17	0.20	0.25	0.25	0.13	0.20	0.17	0.20	0.20	1.00	0.33	0.50	0.50	0.50	0.20	0.17	0.20	0.25	0.25
A27	0.20	0.20	0.25	0.33	0.20	0.11	0.20	0.17	2.00	0.20	3.00	1.00	1.00	1.00	4.00	0.20	0.20	0.25	0.33	0.20
A28	0.20	0.20	0.20	0.20	0.20	0.17	0.50	0.20	1.00	0.50	2.00	1.00	1.00	1.00	2.00	0.20	0.20	0.20	0.20	0.20
A29	0.33	0.17	0.20	0.20	0.50	0.17	0.20	0.33	1.00	0.17	2.00	1.00	1.00	1.00	3.00	0.33	0.17	0.20	0.20	0.50
A30	0.20	0.17	0.17	0.20	0.20	0.13	0.25	0.20	0.20	0.20	2.00	0.25	0.50	0.33	1.00	0.20	0.17	0.17	0.20	0.20
A31	1.00	2.00	0.50	1.00	6.00	0.50	5.00	5.00	5.00	2.00	5.00	5.00	5.00	3.00	5.00	1.00	2.00	0.50	1.00	6.00
A32	0.50	1.00	1.00	0.50	6.00	0.50	5.00	2.00	6.00	2.00	6.00	5.00	5.00	6.00	6.00	0.50	1.00	1.00	0.50	6.00
A33	2.00	1.00	1.00	1.00	5.00	0.50	5.00	2.00	5.00	5.00	5.00	4.00	5.00	5.00	6.00	2.00	1.00	1.00	1.00	5.00
A34	1.00	2.00	1.00	1.00	5.00	0.50	5.00	5.00	3.00	6.00	4.00	3.00	5.00	5.00	5.00	1.00	2.00	1.00	1.00	5.00
A35	0.17	0.17	0.20	0.20	1.00	0.50	1.00	1.00	6.00	0.50	4.00	5.00	5.00	2.00	5.00	0.17	0.17	0.20	0.20	1.00
A36	2.00	2.00	2.00	2.00	2.00	1.00	7.00	6.00	7.00	8.00	8.00	9.00	6.00	6.00	8.00	2.00	2.00	2.00	2.00	2.00
A37	0.20	0.20	0.20	0.20	1.00	0.14	1.00	0.33	2.00	1.00	5.00	5.00	2.00	5.00	4.00	0.20	0.20	0.20	0.20	1.00
A38	0.20	0.50	0.50	0.20	1.00	0.17	3.00	1.00	7.00	1.00	6.00	6.00	5.00	3.00	5.00	0.20	0.50	0.50	0.20	1.00
A39	0.20	0.17	0.20	0.33	0.17	0.14	0.50	0.14	1.00	1.00	5.00	0.50	1.00	1.00	5.00	0.20	0.17	0.20	0.33	0.17
A40	0.50	0.50	0.20	0.17	2.00	0.13	1.00	1.00	1.00	1.00	5.00	5.00	2.00	6.00	5.00	0.50	0.50	0.20	0.17	2.00
TOTAL	28.13	29.85	22.76	24.02	69.50	13.41	113.08	83.79	124.67	97.25	149.77	159.58	148.00	149.83	176.83	28.63	29.85	21.76	24.02	69.50

Technological	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
A1	0.33	8.00	3.00	5.00	5.00	3.00	5.00	6.00	5.00	5.00	1.00	0.50	1.00	0.50	1.00	0.33	8.00	3.00	5.00	5.00
A2	0.50	5.00	5.00	2.00	5.00	3.00	4.00	4.00	5.00	4.00	2.00	1.00	0.50	1.00	1.00	0.50	5.00	5.00	2.00	5.00
A3	0.50	6.00	7.00	6.00	5.00	5.00	5.00	6.00	5.00	5.00	1.00	2.00	1.00	2.00	2.00	0.50	6.00	7.00	6.00	5.00
A4	0.50	4.00	4.00	5.00	4.00	5.00	5.00	5.00	4.00	3.00	2.00	1.00	0.50	1.00	1.00	0.50	4.00	4.00	5.00	4.00
A5	0.50	6.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	4.00	5.00
A6	0.50	8.00	7.00	7.00	8.00	8.00	7.00	7.00	7.00	7.00	3.00	2.00	2.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00
A7	0.13	2.00	0.50	1.00	1.00	0.50	6.00	5.00	6.00	5.00	0.13	0.20	0.17	0.25	0.17	0.13	1.00	0.50	1.00	1.00
A8	0.14	2.00	0.50	1.00	2.00	1.00	5.00	5.00	5.00	6.00	0.33	0.20	0.14	0.25	0.20	0.14	2.00	1.00	1.00	2.00
A9	0.14	1.00	1.00	2.00	2.00	1.00	5.00	5.00	6.00	5.00	0.20	0.50	0.17	0.20	0.25	0.14	1.00	1.00	1.00	2.00
A10	0.13	1.00	0.50	0.50	1.00	0.50	4.00	5.00	3.00	5.00	0.20	0.20	0.20	0.25	0.20	0.13	1.00	0.50	0.50	1.00
A11	0.13	2.00	1.00	1.00	2.00	1.00	6.00	5.00	5.00	5.00	0.33	0.33	0.20	0.20	0.20	0.13	2.00	1.00	1.00	2.00
A12	0.14	0.17	0.20	0.20	0.25	0.17	1.00	1.00	1.00	1.00	0.20	0.25	0.20	0.20	0.20	0.14	0.17	0.20	0.20	0.25
A13	0.14	0.20	0.20	0.20	0.20	0.20	1.00	1.00	1.00	1.00	0.17	0.25	0.17	0.20	0.20	0.14	0.20	0.20	0.20	0.20
A14	0.14	0.17	0.20	0.17	0.33	0.20	1.00	1.00	1.00	0.33	0.20	0.20	0.20	0.25	0.20	0.14	0.17	0.20	0.17	0.33
A15	0.14	0.20	0.17	0.20	0.20	0.20	1.00	1.00	3.00	1.00	0.20	0.25	0.20	0.33	0.20	0.14	0.20	0.17	0.20	0.20
A16	0.50	5.00	5.00	5.00	2.00	5.00	5.00	5.00	3.00	5.00	1.00	2.00	0.50	1.00	6.00	0.50	5.00	5.00	5.00	2.00
A17	0.50	5.00	2.00	6.00	2.00	6.00	5.00	5.00	6.00	6.00	0.50	1.00	1.00	0.50	6.00	0.50	5.00	2.00	6.00	2.00
A18	0.50	5.00	2.00	5.00	5.00	5.00	4.00	5.00	5.00	6.00	2.00	1.00	1.00	1.00	5.00	0.50	5.00	2.00	5.00	5.00
A19	0.50	5.00	5.00	3.00	6.00	4.00	3.00	5.00	5.00	5.00	1.00	2.00	1.00	1.00	5.00	0.50	5.00	5.00	3.00	6.00
A20	0.50	1.00	1.00	6.00	0.50	4.00	5.00	5.00	2.00	5.00	0.17	0.17	0.20	0.20	1.00	0.50	1.00	1.00	6.00	0.50
A21	1.00	7.00	6.00	7.00	8.00	8.00	9.00	6.00	6.00	8.00	2.00	2.00	2.00	2.00	2.00	1.00	7.00	6.00	7.00	8.00
A22	0.14	1.00	0.33	2.00	1.00	5.00	5.00	2.00	5.00	4.00	0.20	0.20	0.20	0.20	1.00	0.14	1.00	0.33	2.00	1.00
A23	0.17	3.00	1.00	7.00	1.00	6.00	6.00	5.00	3.00	5.00	0.20	0.50	0.50	0.20	1.00	0.17	3.00	1.00	7.00	1.00
A24	0.14	0.50	0.14	1.00	1.00	5.00	0.50	1.00	1.00	5.00	0.20	0.17	0.20	0.33	0.17	0.14	0.50	0.14	1.00	1.00
A25	0.13	1.00	1.00	1.00	1.00	5.00	5.00	2.00	6.00	5.00	0.50	0.50	0.20	0.17	2.00	0.13	1.00	1.00	1.00	1.00
A26	0.13	0.20	0.17	0.20	0.20	1.00	0.33	0.50	0.50	0.50	0.20	0.17	0.20	0.25	0.25	0.13	0.20	0.17	0.20	0.20
A27	0.11	0.20	0.17	2.00	0.20	3.00	1.00	1.00	1.00	4.00	0.20	0.20	0.25	0.33	0.20	0.11	0.20	0.17	2.00	0.20
A28	0.17	0.50	0.20	1.00	0.50	2.00	1.00	1.00	1.00	2.00	0.20	0.20	0.20	0.20	0.20	0.17	0.50	0.20	1.00	0.50
A29	0.17	0.20	0.33	1.00	0.17	2.00	1.00	1.00	1.00	3.00	0.33	0.17	0.20	0.20	0.50	0.17	0.20	0.33	1.00	0.17
A30	0.13	0.25	0.20	0.20	0.20	2.00	0.25	0.50	0.33	1.00	0.20	0.17	0.17	0.20	0.20	0.13	0.25	0.20	0.20	0.20
A31	0.50	5.00	5.00	5.00	2.00	5.00	5.00	5.00	3.00	5.00	1.00	2.00	0.50	1.00	6.00	0.50	5.00	5.00	5.00	2.00
A32	0.50	5.00	2.00	6.00	2.00	6.00	5.00	5.00	6.00	6.00	0.50	1.00	1.00	0.50	6.00	0.50	5.00	2.00	6.00	2.00
A33	0.50	5.00	2.00	5.00	5.00	5.00	4.00	5.00	5.00	6.00	2.00	1.00	1.00	1.00	5.00	0.50	5.00	2.00	5.00	5.00
A34	0.50	5.00	5.00	3.00	6.00	4.00	3.00	5.00	5.00	5.00	1.00	2.00	1.00	1.00	5.00	0.50	5.00	5.00	3.00	6.00
A35	0.50	1.00	1.00	6.00	0.50	4.00	5.00	5.00	2.00	5.00	0.17	0.17	0.20	0.20	1.00	0.50	1.00	1.00	6.00	0.50
A36	1.00	7.00	6.00	7.00	8.00	8.00	9.00	6.00	6.00	8.00	2.00	2.00	2.00	2.00	2.00	1.00	7.00	6.00	7.00	8.00
A37	0.14	1.00	0.33	2.00	1.00	5.00	5.00	2.00	5.00	4.00	0.20	0.20	0.20	0.20	1.00	0.14	1.00	0.33	2.00	1.00
A38	0.17	3.00	1.00	7.00	1.00	6.00	6.00	5.00	3.00	5.00	0.20	0.50	0.50	0.20	1.00	0.17	3.00	1.00	7.00	1.00
A39	0.14	0.50	0.14	1.00	1.00	5.00	0.50	1.00	1.00	5.00	0.20	0.17	0.20	0.33	0.17	0.14	0.50	0.14	1.00	1.00
A40	0.13	1.00	1.00	1.00	1.00	5.00	5.00	2.00	6.00	5.00	0.50	0.50	0.20	0.17	2.00	0.13	1.00	1.00	1.00	1.00
TOTAL	12.91	114.08	83.29	125.67	97.25	149.77	159.58	148.00	149.83	176.83	28.63	29.85	21.76	24.02	69.50	13.41	113.08	83.79	124.67	97.25

Criteria 4 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.04	0.02	0.09	0.02	0.01	0.02	0.07	0.04	0.04	0.05	0.02	0.03	0.04	0.03	0.03	0.03	0.02	0.05	0.02	0.01	0.03	0.07	0.04	0.04	0.05	0.02	0.03	0.04	0.03	0.03	0.03	0.02	0.05	0.02	0.01	0.02	0.07	0.04	0.04	0.05	**1.42**	0.035429
A2	0.07	0.03	0.02	0.04	0.01	0.04	0.04	0.06	0.02	0.05	0.02	0.03	0.03	0.03	0.02	0.07	0.03	0.02	0.04	0.01	0.04	0.04	0.06	0.02	0.05	0.02	0.03	0.03	0.03	0.02	0.07	0.03	0.02	0.04	0.01	0.04	0.04	0.06	0.02	0.05	**1.43**	0.035768
A3	0.02	0.07	0.04	0.08	0.03	0.04	0.05	0.08	0.05	0.05	0.03	0.03	0.04	0.03	0.03	0.03	0.07	0.05	0.08	0.03	0.04	0.05	0.08	0.05	0.05	0.03	0.03	0.04	0.03	0.03	0.03	0.07	0.05	0.08	0.03	0.04	0.05	0.08	0.05	0.05	**1.92**	0.047896
A4	0.07	0.03	0.02	0.04	0.01	0.04	0.04	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.07	0.03	0.02	0.04	0.01	0.04	0.04	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.07	0.03	0.02	0.04	0.01	0.04	0.04	0.05	0.04	0.04	**1.44**	0.035941
A5	0.04	0.03	0.02	0.04	0.01	0.04	0.05	0.06	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.01	0.04	0.05	0.06	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.01	0.04	0.05	0.06	0.03	0.05	**1.46**	0.036596
A6	0.11	0.07	0.09	0.08	0.03	0.07	0.07	0.08	0.06	0.08	0.05	0.04	0.05	0.05	0.04	0.10	0.07	0.09	0.08	0.03	0.04	0.07	0.08	0.06	0.08	0.05	0.04	0.05	0.05	0.04	0.10	0.07	0.09	0.08	0.03	0.07	0.07	0.08	0.06	0.08	**2.65**	0.066306
A7	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.04	0.03	0.04	0.03	0.00	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.01	0.00	0.04	0.03	0.04	0.03	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	**0.52**	0.012919
A8	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.02	**0.59**	0.014838
A9	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.04	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.01	0.03	0.03	0.04	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	**0.60**	0.014958
A10	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.03	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.03	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	**0.44**	0.011119
A11	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.02	0.01	0.04	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.02	0.01	0.04	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.02	**0.61**	0.015291
A12	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.22**	0.005410
A13	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.21**	0.005203
A14	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.21**	0.005307
A15	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.26**	0.006458
A16	0.04	0.07	0.02	0.04	0.09	0.04	0.04	0.06	0.04	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.07	0.02	0.04	0.09	0.04	0.04	0.06	0.04	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.07	0.02	0.04	0.09	0.04	0.04	0.06	0.04	0.02	**1.66**	0.041462
A17	0.02	0.03	0.04	0.02	0.09	0.04	0.04	0.02	0.05	0.02	0.04	0.03	0.03	0.04	0.03	0.02	0.03	0.05	0.02	0.09	0.04	0.04	0.02	0.05	0.02	0.04	0.03	0.03	0.04	0.03	0.02	0.03	0.05	0.02	0.09	0.04	0.04	0.02	0.05	0.02	**1.49**	0.037295
A18	0.07	0.03	0.04	0.04	0.07	0.04	0.04	0.02	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.03	0.05	0.04	0.07	0.04	0.04	0.02	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.03	0.05	0.04	0.07	0.04	0.04	0.02	0.04	0.05	**1.70**	0.042463
A19	0.04	0.07	0.04	0.04	0.07	0.04	0.04	0.06	0.02	0.06	0.03	0.02	0.03	0.03	0.03	0.03	0.07	0.05	0.04	0.07	0.04	0.04	0.06	0.02	0.06	0.03	0.02	0.03	0.03	0.03	0.03	0.07	0.05	0.04	0.07	0.04	0.04	0.06	0.02	0.06	**1.75**	0.043672
A20	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.05	0.01	0.03	0.03	0.03	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.05	0.01	0.03	0.03	0.03	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.05	0.01	**0.73**	0.018289
A21	0.07	0.07	0.09	0.08	0.03	0.07	0.06	0.07	0.06	0.08	0.05	0.06	0.04	0.04	0.05	0.07	0.07	0.09	0.08	0.03	0.08	0.06	0.07	0.06	0.08	0.05	0.06	0.04	0.04	0.05	0.07	0.07	0.09	0.08	0.03	0.07	0.06	0.07	0.06	0.08	**2.53**	0.063318
A22	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.03	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.03	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	**0.55**	0.013864
A23	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.01	0.06	0.01	0.04	0.04	0.03	0.02	0.03	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.01	0.06	0.01	0.04	0.04	0.03	0.02	0.03	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.01	0.06	0.01	**0.88**	0.021968
A24	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.03	0.00	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.03	0.00	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	**0.38**	0.009396
A25	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.04	0.03	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.04	0.03	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	**0.68**	0.016897
A26	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.19**	0.004855
A27	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.00	**0.34**	0.008518
A28	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	**0.29**	0.007207
A29	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.31**	0.007745
A30	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.20**	0.004988
A31	0.04	0.07	0.02	0.04	0.09	0.04	0.04	0.06	0.04	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.07	0.02	0.04	0.09	0.04	0.04	0.06	0.04	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.07	0.02	0.04	0.09	0.04	0.04	0.06	0.04	0.02	**1.66**	0.041462
A32	0.02	0.03	0.04	0.02	0.09	0.04	0.04	0.02	0.05	0.02	0.04	0.03	0.03	0.04	0.03	0.02	0.03	0.05	0.02	0.09	0.04	0.04	0.02	0.05	0.02	0.04	0.03	0.03	0.04	0.03	0.02	0.03	0.05	0.02	0.09	0.04	0.04	0.02	0.05	0.02	**1.49**	0.037295
A33	0.07	0.03	0.04	0.04	0.07	0.04	0.04	0.02	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.03	0.05	0.04	0.07	0.04	0.04	0.02	0.04	0.05	0.03	0.03	0.03	0.03	0.03	0.07	0.03	0.05	0.04	0.07	0.04	0.04	0.02	0.04	0.05	**1.70**	0.042463
A34	0.04	0.07	0.04	0.04	0.07	0.04	0.04	0.06	0.02	0.06	0.03	0.02	0.03	0.03	0.03	0.03	0.07	0.05	0.04	0.07	0.04	0.04	0.06	0.02	0.06	0.03	0.02	0.03	0.03	0.03	0.03	0.07	0.05	0.04	0.07	0.04	0.04	0.06	0.02	0.06	**1.75**	0.043672
A35	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.05	0.01	0.03	0.03	0.03	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.05	0.01	0.03	0.03	0.03	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.05	0.01	**0.73**	0.018289
A36	0.07	0.07	0.09	0.08	0.03	0.07	0.06	0.07	0.06	0.08	0.05	0.06	0.04	0.04	0.05	0.07	0.07	0.09	0.08	0.03	0.08	0.06	0.07	0.06	0.08	0.05	0.06	0.04	0.04	0.05	0.07	0.07	0.09	0.08	0.03	0.07	0.06	0.07	0.06	0.08	**2.53**	0.063318
A37	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.03	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.03	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.01	**0.55**	0.013864
A38	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.01	0.06	0.01	0.04	0.04	0.03	0.02	0.03	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.01	0.06	0.01	0.04	0.04	0.03	0.02	0.03	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.01	0.06	0.01	**0.88**	0.021968
A39	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.03	0.00	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.03	0.00	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	**0.38**	0.009396
A40	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.04	0.03	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.04	0.03	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	**0.68**	0.016897

Criteria 5 Matrix (Legal)

Legal	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A
A1	1.00	5.00	2.00	1.00	5.00	1.00	6.00	4.00	5.00	6.00	2.00	3.00	6.00	6.00	6.00	2.00	5.00	2.00	1.00	5.00	1.00	6.00	4.00	5.00	6.00	2.00	3.00	6.00	6.00	6.00	0.50	5.00	2.00	1.00	5.00	1.00	6.00	4.00	5.00	6
A2	0.20	1.00	1.00	1.00	1.00	0.33	6.00	5.00	6.00	3.00	3.00	5.00	5.00	5.00	6.00	0.20	1.00	1.00	1.00	1.00	0.33	6.00	5.00	6.00	3.00	3.00	5.00	5.00	5.00	6.00	0.20	1.00	1.00	1.00	1.00	0.33	6.00	5.00	6.00	3
A3	0.50	1.00	1.00	1.00	2.00	0.33	5.00	7.00	6.00	6.00	6.00	6.00	6.00	5.00	6.00	0.50	1.00	1.00	1.00	2.00	0.33	5.00	7.00	6.00	6.00	6.00	6.00	6.00	5.00	6.00	0.50	1.00	1.00	1.00	2.00	0.33	5.00	7.00	6.00	6
A4	1.00	1.00	1.00	1.00	1.00	0.50	5.00	5.00	6.00	5.00	5.00	7.00	5.00	5.00	6.00	1.00	1.00	1.00	1.00	1.00	0.50	5.00	5.00	6.00	5.00	5.00	7.00	5.00	5.00	6.00	1.00	1.00	1.00	1.00	1.00	0.50	5.00	5.00	6.00	5
A5	0.20	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	6.00	6.00	4.00	6.00	6.00	5.00	0.20	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	6.00	6.00	4.00	6.00	6.00	5.00	0.20	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	6
A6	1.00	3.00	3.00	2.00	2.00	1.00	8.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	7.00	1.00	3.00	3.00	2.00	2.00	2.00	8.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	7.00	1.00	3.00	3.00	2.00	2.00	2.00	8.00	7.00	7.00	8
A7	0.17	0.17	0.20	0.20	0.17	0.13	1.00	2.00	1.00	2.00	0.50	1.00	7.00	6.00	7.00	0.17	0.17	0.20	0.20	0.17	0.13	1.00	2.00	1.00	2.00	0.50	1.00	7.00	6.00	7.00	0.17	0.17	0.20	0.20	0.17	0.13	1.00	2.00	1.00	2
A8	0.25	0.20	0.14	0.20	0.20	0.14	0.50	1.00	1.00	1.00	0.33	0.33	6.00	5.00	6.00	0.25	0.20	0.14	0.20	0.20	0.14	0.50	1.00	1.00	1.00	0.33	0.33	6.00	5.00	6.00	0.25	0.20	0.14	0.20	0.20	0.14	0.50	1.00	1.00	1
A9	0.20	0.17	0.17	0.17	0.20	0.14	1.00	1.00	1.00	2.00	1.00	1.00	6.00	6.00	6.00	0.20	0.17	0.17	0.17	0.20	0.14	1.00	1.00	1.00	2.00	1.00	1.00	6.00	6.00	6.00	0.20	0.17	0.17	0.17	0.20	0.14	1.00	1.00	1.00	2
A10	0.17	0.33	0.17	0.20	0.17	0.13	0.50	1.00	0.50	1.00	0.50	1.00	5.00	2.00	4.00	0.17	0.33	0.17	0.20	0.17	0.13	0.50	1.00	0.50	1.00	0.50	1.00	5.00	2.00	4.00	0.17	0.33	0.17	0.20	0.17	0.13	0.50	1.00	0.50	1
A11	0.50	0.33	0.17	0.20	0.17	0.14	2.00	3.00	1.00	2.00	1.00	2.00	5.00	6.00	6.00	0.50	0.33	0.17	0.20	0.17	0.14	2.00	3.00	1.00	2.00	1.00	2.00	5.00	6.00	6.00	0.50	0.33	0.17	0.20	0.17	0.14	2.00	3.00	1.00	2
A12	0.33	0.20	0.17	0.14	0.25	0.14	1.00	3.00	1.00	1.00	0.50	1.00	5.00	4.00	5.00	0.33	0.20	0.17	0.14	0.25	0.14	1.00	3.00	1.00	1.00	0.50	1.00	5.00	4.00	5.00	0.33	0.20	0.17	0.14	0.25	0.14	1.00	3.00	1.00	1
A13	0.17	0.20	0.17	0.20	0.17	0.13	0.14	0.17	0.17	0.20	0.20	0.20	1.00	1.00	1.00	0.17	0.20	0.17	0.20	0.17	0.13	0.14	0.17	0.17	0.20	0.20	0.20	1.00	1.00	1.00	0.17	0.20	0.17	0.20	0.17	0.13	0.14	0.17	0.17	0
A14	0.17	0.20	0.20	0.20	0.17	0.13	0.17	0.20	0.17	0.50	0.17	0.25	1.00	1.00	1.00	0.17	0.20	0.20	0.20	0.17	0.13	0.17	0.20	0.17	0.50	0.17	0.25	1.00	1.00	1.00	0.17	0.20	0.20	0.20	0.17	0.13	0.17	0.20	0.17	0
A15	0.17	0.17	0.17	0.17	0.20	0.14	0.14	0.17	0.17	0.25	0.17	0.20	1.00	1.00	1.00	0.17	0.17	0.17	0.17	0.20	0.14	0.14	0.17	0.17	0.25	0.17	0.20	1.00	1.00	1.00	0.17	0.17	0.17	0.17	0.20	0.14	0.14	0.17	0.17	0
A16	1.00	1.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	2.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	2.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3
A17	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6
A18	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5
A19	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.
A20	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00	3.00	5.00	5.00	5.00	5.
A21	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.
A22	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.
A23	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.
A24	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.
A25	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.
A26	0.17	0.50	0.50	0.17	0.20	0.14	1.00	2.00	2.00	2.00	1.00	1.00	4.00	5.00	5.00	0.17	0.50	0.50	0.17	0.20	0.14	1.00	2.00	2.00	2.00	1.00	1.00	4.00	5.00	5.00	0.17	0.50	0.50	0.17	0.20	0.14	1.00	2.00	2.00	2.
A27	0.20	0.17	0.50	0.25	0.20	0.13	3.00	3.00	3.00	1.00	1.00	1.00	5.00	5.00	4.00	0.20	0.17	0.50	0.25	0.20	0.13	3.00	3.00	3.00	1.00	1.00	1.00	5.00	5.00	4.00	0.20	0.17	0.50	0.25	0.20	0.13	3.00	3.00	3.00	1.
A28	0.25	0.20	0.17	0.20	0.17	0.13	0.20	0.20	1.00	0.20	0.25	0.20	1.00	0.50	1.00	0.25	0.20	0.17	0.20	0.17	0.13	0.20	0.20	1.00	0.20	0.25	0.20	1.00	0.50	1.00	0.25	0.20	0.17	0.20	0.17	0.13	0.20	0.20	1.00	0.
A29	0.20	0.17	0.33	0.20	0.17	0.17	0.25	0.20	4.00	3.00	0.20	0.20	2.00	1.00	4.00	0.20	0.17	0.33	0.20	0.17	0.17	0.25	0.20	4.00	3.00	0.20	0.20	2.00	1.00	4.00	0.20	0.17	0.33	0.20	0.17	0.17	0.25	0.20	4.00	3.
A30	0.17	0.17	0.20	0.20	0.20	0.13	0.20	0.20	1.00	0.20	0.20	0.25	1.00	0.25	1.00	0.17	0.17	0.20	0.20	0.20	0.13	0.20	0.20	1.00	0.20	0.20	0.25	1.00	0.25	1.00	0.17	0.17	0.20	0.20	0.20	0.13	0.20	0.20	1.00	0.
A31	1.00	1.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	2.00	2.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.00	6.00	5.00	4.00	5.00	6.00	1.00	2.00	1.00	0.33	1.00	0.33	5.00	4.00	5.00	3.
A32	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.00	2.00	6.00	5.00	6.00	6.00	1.00	1.00	5.00	4.00	2.00	0.50	5.00	5.00	6.00	6.
A33	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.00	2.00	2.00	6.00	3.00	5.00	1.00	0.20	1.00	1.00	1.00	0.50	6.00	4.00	5.00	5.
A34	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.00	6.00	4.00	5.00	5.00	5.00	3.00	0.25	1.00	1.00	1.00	0.33	4.00	3.00	6.00	5.
A35	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00	0.50	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	5.00	1.00	0.50	1.00	1.00	1.00	3.00	5.00	5.00	5.00	5.
A36	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00	2.00	7.00	7.00	8.00	7.00	7.00	8.00	8.00	6.00	8.00	3.00	2.00	2.00	3.00	2.00	1.00	7.00	7.00	8.00	7.
A37	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.00	1.00	0.33	5.00	4.00	5.00	0.20	0.20	0.17	0.25	0.20	0.14	1.00	1.00	4.00	4.
A38	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.00	0.50	0.33	5.00	5.00	5.00	0.25	0.20	0.25	0.33	0.20	0.14	1.00	1.00	5.00	1.
A39	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.50	0.50	0.33	1.00	0.25	1.00	0.20	0.17	0.20	0.17	0.20	0.13	0.25	0.20	1.00	0.
A40	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.00	0.50	1.00	5.00	0.33	5.00	0.33	0.17	0.20	0.20	0.20	0.14	0.25	1.00	2.00	1.
TOTAL	28.97	26.53	35.38	32.26	32.22	13.01	116.10	112.53	146.00	125.35	97.02	105.63	186.00	159.92	190.00	30.97	28.53	35.38	32.26	32.22	15.01	116.10	112.53	146.00	125.35	97.02	105.63	186.00	159.92	190.00	28.47	28.53	35.38	32.26	32.22	19.01	116.10	112.53	146.00	125

Criteria 5 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.03	0.19	0.06	0.03	0.16	0.08	0.05	0.04	0.03	0.05	0.02	0.03	0.03	0.04	0.03	0.06	0.18	0.06	0.03	0.16	0.07	0.05	0.04	0.03	0.05	0.02	0.03	0.03	0.04	0.03	0.02	0.18	0.06	0.03	0.16	0.05	0.05	0.04	0.03	0.05	**2.39**	0.059717
A2	0.01	0.04	0.03	0.03	0.03	0.03	0.05	0.04	0.04	0.02	0.03	0.05	0.03	0.03	0.03	0.01	0.04	0.03	0.03	0.03	0.02	0.05	0.04	0.04	0.02	0.03	0.05	0.03	0.03	0.03	0.01	0.04	0.03	0.03	0.03	0.02	0.05	0.04	0.04	0.02	**1.28**	0.032096
A3	0.02	0.04	0.03	0.03	0.06	0.03	0.04	0.06	0.04	0.05	0.06	0.06	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.06	0.02	0.04	0.06	0.04	0.05	0.06	0.06	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.06	0.02	0.04	0.06	0.04	0.05	**1.60**	0.039959
A4	0.03	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.07	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.07	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	**1.50**	0.037481
A5	0.01	0.04	0.01	0.03	0.03	0.04	0.05	0.04	0.03	0.05	0.06	0.04	0.03	0.04	0.03	0.01	0.04	0.01	0.03	0.03	0.03	0.05	0.04	0.03	0.05	0.06	0.04	0.03	0.04	0.03	0.01	0.04	0.01	0.03	0.03	0.03	0.05	0.04	0.03	0.05	**1.38**	0.034526
A6	0.03	0.11	0.08	0.06	0.06	0.08	0.07	0.06	0.05	0.06	0.07	0.07	0.04	0.05	0.04	0.03	0.11	0.08	0.06	0.06	0.13	0.07	0.06	0.05	0.06	0.07	0.07	0.04	0.05	0.04	0.04	0.11	0.08	0.06	0.06	0.11	0.07	0.06	0.05	0.06	**2.63**	0.065814
A7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	**0.51**	0.012784
A8	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.41**	0.010296
A9	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.04	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.04	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	**0.48**	0.011945
A10	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	**0.35**	0.008740
A11	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.03	0.01	0.02	0.01	0.02	0.03	0.04	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.03	0.01	0.02	0.01	0.02	0.03	0.04	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.03	0.01	0.02	**0.61**	0.015342
A12	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.03	0.01	0.01	**0.47**	0.011755
A13	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	**0.17**	0.004234
A14	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	**0.18**	0.004528
A15	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	**0.17**	0.004245
A16	0.03	0.04	0.03	0.01	0.03	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.03	0.07	0.03	0.01	0.03	0.02	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.04	0.07	0.03	0.01	0.03	0.02	0.04	0.04	0.03	0.02	**1.35**	0.033789
A17	0.03	0.04	0.14	0.12	0.06	0.04	0.04	0.04	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.04	0.14	0.12	0.06	0.03	0.04	0.04	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.04	0.04	0.14	0.12	0.06	0.03	0.04	0.04	0.04	0.05	**2.17**	0.054155
A18	0.03	0.01	0.03	0.03	0.03	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.03	0.03	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.04	0.01	0.03	0.03	0.03	0.03	0.05	0.04	0.03	0.04	**1.21**	0.030258
A19	0.10	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.10	0.01	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.11	0.01	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.04	**1.46**	0.036593
A20	0.03	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.04	0.02	0.03	0.03	0.03	0.16	0.04	0.04	0.03	0.04	**1.53**	0.038280
A21	0.10	0.08	0.06	0.09	0.06	0.08	0.06	0.06	0.05	0.06	0.07	0.08	0.04	0.04	0.04	0.10	0.07	0.06	0.09	0.06	0.07	0.06	0.06	0.05	0.06	0.07	0.08	0.04	0.04	0.04	0.11	0.07	0.06	0.09	0.06	0.05	0.06	0.06	0.05	0.06	**2.59**	0.064820
A22	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	**0.54**	0.013494
A23	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	**0.51**	0.012765
A24	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.20**	0.004982
A25	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.37**	0.009303
A26	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	**0.54**	0.013532
A27	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.01	**0.59**	0.014704
A28	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.19**	0.004803
A29	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.03	0.02	**0.38**	0.009581
A30	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.18**	0.004569
A31	0.03	0.04	0.03	0.01	0.03	0.03	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.06	0.07	0.03	0.01	0.03	0.02	0.04	0.04	0.03	0.02	0.06	0.05	0.02	0.03	0.03	0.04	0.07	0.03	0.01	0.03	0.02	0.04	0.04	0.03	0.02	**1.38**	0.034596
A32	0.03	0.04	0.14	0.12	0.06	0.04	0.04	0.04	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.03	0.04	0.14	0.12	0.06	0.03	0.04	0.04	0.04	0.05	0.02	0.06	0.03	0.04	0.03	0.04	0.04	0.14	0.12	0.06	0.03	0.04	0.04	0.04	0.05	**2.17**	0.054155
A33	0.03	0.01	0.03	0.03	0.03	0.04	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.03	0.03	0.05	0.04	0.03	0.04	0.02	0.02	0.03	0.02	0.03	0.04	0.01	0.03	0.03	0.03	0.03	0.05	0.04	0.03	0.04	**1.21**	0.030258
A34	0.10	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.10	0.01	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.04	0.06	0.04	0.03	0.03	0.03	0.11	0.01	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.04	**1.46**	0.036593
A35	0.03	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.05	0.05	0.03	0.04	0.03	0.04	0.02	0.03	0.03	0.03	0.16	0.04	0.04	0.03	0.04	**1.53**	0.038280
A36	0.10	0.08	0.06	0.09	0.06	0.08	0.06	0.06	0.05	0.06	0.07	0.08	0.04	0.04	0.04	0.10	0.07	0.06	0.09	0.06	0.13	0.06	0.06	0.05	0.06	0.07	0.08	0.04	0.04	0.04	0.11	0.07	0.06	0.09	0.06	0.05	0.06	0.06	0.05	0.06	**2.66**	0.066486
A37	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	**0.54**	0.013494
A38	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	**0.51**	0.012765
A39	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	**0.20**	0.004982
A40	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.37**	0.009303

Criteria 6 Matrix (Environmental)

Environmental	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
A1	1.00	1.00	1.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	1.00	0.50	1.00	1.00	1.00
A2	1.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00
A3	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00
A4	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00
A5	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00
A6	3.00	2.00	3.00	3.00	3.00	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00
A7	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20
A8	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17
A9	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20
A10	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17
A11	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20
A12	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20
A13	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17
A14	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17
A15	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17
A16	1.00	0.33	4.00	1.00	0.33	0.50	2.00	5.00	1.00	6.00	6.00	6.00	5.00	3.00	6.00	1.00	0.33	4.00	1.00	0.33
A17	3.00	1.00	5.00	0.50	1.00	0.50	5.00	5.00	0.50	6.00	5.00	3.00	2.00	4.00	6.00	3.00	1.00	5.00	0.50	1.00
A18	0.25	0.20	1.00	1.00	0.50	0.33	1.00	6.00	1.00	2.00	6.00	6.00	3.00	3.00	6.00	0.25	0.20	1.00	1.00	0.50
A19	1.00	2.00	1.00	1.00	3.00	0.50	5.00	4.00	0.50	5.00	5.00	4.00	2.00	6.00	5.00	1.00	2.00	1.00	1.00	3.00
A20	3.00	1.00	2.00	0.33	1.00	0.50	2.00	5.00	0.50	3.00	5.00	5.00	6.00	3.00	6.00	3.00	1.00	2.00	0.33	1.00
A21	2.00	2.00	3.00	2.00	2.00	0.33	8.00	8.00	2.00	8.00	7.00	8.00	8.00	7.00	8.00	2.00	2.00	3.00	2.00	2.00
A22	0.50	0.20	1.00	0.20	0.50	0.13	1.00	6.00	1.00	6.00	6.00	7.00	1.00	6.00	5.00	0.50	0.20	1.00	0.20	0.50
A23	0.20	0.20	0.17	0.25	0.20	0.13	0.17	1.00	0.33	1.00	0.50	2.00	0.33	1.00	2.00	0.20	0.20	0.17	0.25	0.20
A24	1.00	2.00	1.00	2.00	2.00	0.50	1.00	3.00	1.00	2.00	6.00	5.00	1.00	6.00	6.00	1.00	2.00	1.00	2.00	2.00
A25	0.17	0.17	0.50	0.20	0.33	0.13	0.17	1.00	0.50	1.00	1.00	3.00	0.50	0.50	5.00	0.17	0.17	0.50	0.20	0.33
A26	0.17	0.20	0.17	0.20	0.20	0.14	0.17	2.00	0.17	1.00	1.00	2.00	1.00	1.00	5.00	0.17	0.20	0.17	0.20	0.20
A27	0.17	0.33	0.17	0.25	0.20	0.13	0.14	0.50	0.20	0.33	0.50	1.00	0.50	0.50	4.00	0.17	0.33	0.17	0.25	0.20
A28	0.20	0.50	0.33	0.50	0.17	0.13	1.00	3.00	1.00	2.00	1.00	2.00	1.00	2.00	5.00	0.20	0.50	0.33	0.50	0.17
A29	0.33	0.25	0.33	0.17	0.33	0.14	0.17	1.00	0.17	2.00	1.00	2.00	0.50	1.00	6.00	0.33	0.25	0.33	0.17	0.33
A30	0.17	0.17	0.17	0.20	0.17	0.13	0.20	0.50	0.17	0.20	0.20	0.25	0.20	0.17	1.00	0.17	0.17	0.17	0.20	0.17
A31	1.00	0.33	4.00	1.00	0.33	0.50	2.00	5.00	1.00	6.00	6.00	6.00	5.00	3.00	6.00	1.00	0.33	4.00	1.00	0.33
A32	3.00	1.00	5.00	0.50	1.00	0.50	5.00	5.00	0.50	6.00	5.00	3.00	2.00	4.00	6.00	3.00	1.00	5.00	0.50	1.00
A33	0.25	0.20	1.00	1.00	0.50	0.33	1.00	6.00	1.00	2.00	6.00	6.00	3.00	3.00	6.00	0.25	0.20	1.00	1.00	0.50
A34	1.00	2.00	1.00	1.00	3.00	0.50	5.00	4.00	0.50	5.00	5.00	4.00	2.00	6.00	5.00	1.00	2.00	1.00	1.00	3.00
A35	3.00	1.00	2.00	0.33	1.00	0.50	2.00	5.00	0.50	3.00	5.00	5.00	6.00	3.00	6.00	3.00	1.00	2.00	0.33	1.00
A36	2.00	2.00	3.00	2.00	2.00	1.00	8.00	8.00	2.00	8.00	7.00	8.00	8.00	7.00	8.00	2.00	2.00	3.00	2.00	2.00
A37	0.50	0.20	1.00	0.20	0.50	0.13	1.00	6.00	1.00	6.00	6.00	7.00	1.00	6.00	5.00	0.50	0.20	1.00	0.20	0.50
A38	0.20	0.20	0.17	0.25	0.20	0.13	0.17	1.00	0.33	1.00	0.50	2.00	0.33	1.00	2.00	0.20	0.20	0.17	0.25	0.20
A39	1.00	2.00	1.00	2.00	2.00	0.50	1.00	3.00	1.00	2.00	6.00	5.00	1.00	6.00	6.00	1.00	2.00	1.00	2.00	2.00
A40	0.17	0.17	0.50	0.20	0.33	0.13	0.17	1.00	0.50	1.00	1.00	3.00	0.50	0.50	5.00	0.17	0.17	0.50	0.20	0.33
TOTAL	35.56	29.91	46.50	29.55	33.43	12.51	96.44	137.43	50.38	134.40	126.21	165.75	132.87	145.67	198.33	36.56	29.41	46.50	29.55	33.43

Environmental	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
A1	0.33	6.00	6.00	2.00	4.00	2.00	6.00	7.00	5.00	5.00	2.00	0.50	2.00	1.00	1.00	0.33	6.00	6.00	2.00	4.00
A2	0.50	6.00	5.00	5.00	2.00	2.00	6.00	5.00	5.00	8.00	2.00	1.00	0.50	1.00	1.00	0.50	6.00	5.00	5.00	2.00
A3	0.33	5.00	8.00	5.00	6.00	6.00	6.00	9.00	6.00	5.00	1.00	2.00	1.00	2.00	2.00	0.33	5.00	8.00	5.00	6.00
A4	0.33	6.00	6.00	2.00	6.00	2.00	6.00	5.00	5.00	5.00	1.00	1.00	0.50	1.00	1.00	0.33	6.00	6.00	2.00	6.00
A5	0.33	5.00	6.00	5.00	6.00	5.00	5.00	6.00	6.00	6.00	1.00	1.00	0.50	1.00	1.00	0.33	5.00	6.00	5.00	6.00
A6	1.00	7.00	7.00	8.00	7.00	6.00	8.00	8.00	6.00	8.00	3.00	2.00	3.00	3.00	3.00	2.00	7.00	7.00	8.00	7.00
A7	0.14	1.00	0.33	1.00	4.00	0.33	5.00	5.00	5.00	4.00	0.17	0.17	0.20	0.17	0.20	0.14	1.00	0.33	1.00	4.00
A8	0.14	3.00	1.00	1.00	4.00	1.00	5.00	4.00	5.00	5.00	0.17	0.20	0.13	0.17	0.17	0.14	3.00	1.00	1.00	4.00
A9	0.13	1.00	1.00	1.00	5.00	1.00	4.00	6.00	5.00	5.00	0.50	0.20	0.20	0.50	0.20	0.13	1.00	1.00	1.00	5.00
A10	0.14	0.25	0.25	0.20	1.00	0.50	1.00	6.00	2.00	5.00	0.25	0.50	0.17	0.17	0.17	0.14	0.25	0.25	0.20	1.00
A11	0.17	3.00	1.00	1.00	2.00	1.00	6.00	6.00	5.00	7.00	0.50	0.50	0.17	0.50	0.20	0.17	3.00	1.00	1.00	2.00
A12	0.13	0.20	0.20	0.25	1.00	0.17	1.00	2.00	2.00	2.00	0.17	0.17	0.17	0.17	0.20	0.13	0.20	0.20	0.25	1.00
A13	0.13	0.20	0.25	0.17	0.17	0.17	0.50	1.00	1.00	1.00	0.14	0.20	0.11	0.20	0.17	0.13	0.20	0.25	0.17	0.17
A14	0.17	0.20	0.20	0.20	0.50	0.20	0.50	1.00	1.00	0.33	0.20	0.20	0.17	0.20	0.17	0.17	0.20	0.20	0.20	0.50
A15	0.13	0.25	0.20	0.20	0.20	0.14	0.50	1.00	3.00	1.00	0.20	0.13	0.20	0.20	0.17	0.13	0.25	0.20	0.20	0.20
A16	0.50	2.00	5.00	1.00	6.00	6.00	6.00	5.00	3.00	6.00	1.00	0.33	4.00	1.00	0.33	0.50	2.00	5.00	1.00	6.00
A17	0.50	5.00	5.00	0.50	6.00	5.00	3.00	2.00	4.00	6.00	3.00	1.00	5.00	0.50	1.00	0.50	5.00	5.00	0.50	6.00
A18	0.33	1.00	6.00	1.00	2.00	6.00	6.00	3.00	3.00	6.00	0.25	0.20	1.00	1.00	0.50	0.33	1.00	6.00	1.00	2.00
A19	0.50	5.00	4.00	0.50	5.00	5.00	4.00	2.00	6.00	5.00	1.00	2.00	1.00	1.00	3.00	0.50	5.00	4.00	0.50	5.00
A20	0.50	2.00	5.00	0.50	3.00	5.00	5.00	6.00	3.00	6.00	3.00	1.00	2.00	0.33	1.00	0.50	2.00	5.00	0.50	3.00
A21	1.00	8.00	8.00	2.00	8.00	7.00	8.00	8.00	7.00	8.00	2.00	2.00	3.00	2.00	2.00	0.50	8.00	8.00	2.00	8.00
A22	0.13	1.00	6.00	1.00	6.00	6.00	7.00	1.00	6.00	5.00	0.50	0.20	1.00	0.20	0.50	0.13	1.00	6.00	1.00	6.00
A23	0.13	0.17	1.00	0.33	1.00	0.50	2.00	0.33	1.00	2.00	0.20	0.20	0.17	0.25	0.20	0.13	0.17	1.00	0.33	1.00
A24	0.50	1.00	3.00	1.00	2.00	6.00	5.00	1.00	6.00	6.00	1.00	2.00	1.00	2.00	2.00	0.50	1.00	3.00	1.00	2.00
A25	0.13	0.17	1.00	0.50	1.00	1.00	3.00	0.50	0.50	5.00	0.17	0.17	0.50	0.20	0.33	0.13	0.17	1.00	0.50	1.00
A26	0.14	0.17	2.00	0.17	1.00	1.00	2.00	1.00	1.00	5.00	0.17	0.20	0.17	0.20	0.20	0.14	0.17	2.00	0.17	1.00
A27	0.13	0.14	0.50	0.20	0.33	0.50	1.00	0.50	0.50	4.00	0.17	0.33	0.17	0.25	0.20	0.13	0.14	0.50	0.20	0.33
A28	0.13	1.00	3.00	1.00	2.00	1.00	2.00	1.00	2.00	5.00	0.20	0.50	0.33	0.50	0.17	0.13	1.00	3.00	1.00	2.00
A29	0.14	0.17	1.00	0.17	2.00	1.00	2.00	0.50	1.00	6.00	0.33	0.25	0.33	0.17	0.33	0.14	0.17	1.00	0.17	2.00
A30	0.13	0.20	0.50	0.17	0.20	0.20	0.25	0.20	0.17	1.00	0.17	0.17	0.17	0.20	0.17	0.13	0.20	0.50	0.17	0.20
A31	0.50	2.00	5.00	1.00	6.00	6.00	6.00	5.00	3.00	6.00	1.00	0.33	4.00	1.00	0.33	0.50	2.00	5.00	1.00	6.00
A32	0.50	5.00	5.00	0.50	6.00	5.00	3.00	2.00	4.00	6.00	3.00	1.00	5.00	0.50	1.00	0.50	5.00	5.00	0.50	6.00
A33	0.33	1.00	6.00	1.00	2.00	6.00	6.00	3.00	3.00	6.00	0.25	0.20	1.00	1.00	0.50	0.33	1.00	6.00	1.00	2.00
A34	0.50	5.00	4.00	0.50	5.00	5.00	4.00	2.00	6.00	5.00	1.00	2.00	1.00	1.00	3.00	0.50	5.00	4.00	0.50	5.00
A35	0.50	2.00	5.00	0.50	3.00	5.00	5.00	6.00	3.00	6.00	3.00	1.00	2.00	0.33	1.00	0.50	2.00	5.00	0.50	3.00
A36	0.50	8.00	8.00	2.00	8.00	7.00	8.00	8.00	7.00	8.00	2.00	2.00	3.00	2.00	2.00	1.00	8.00	8.00	2.00	8.00
A37	0.13	1.00	6.00	1.00	6.00	6.00	7.00	1.00	6.00	5.00	0.50	0.20	1.00	0.20	0.50	0.13	1.00	6.00	1.00	6.00
A38	0.13	0.17	1.00	0.33	1.00	0.50	2.00	0.33	1.00	2.00	0.20	0.20	0.17	0.25	0.20	0.13	0.17	1.00	0.33	1.00
A39	0.50	1.00	3.00	1.00	2.00	6.00	5.00	1.00	6.00	6.00	1.00	2.00	1.00	2.00	2.00	0.50	1.00	3.00	1.00	2.00
A40	0.13	0.17	1.00	0.50	1.00	1.00	3.00	0.50	0.50	5.00	0.17	0.17	0.50	0.20	0.33	0.13	0.17	1.00	0.50	1.00
TOTAL	12.67	96.44	137.43	50.38	134.40	126.21	165.75	132.87	145.67	198.33	37.56	29.41	47.50	29.55	33.43	13.67	96.44	137.43	50.38	134.40

Criteria 6 Normalization

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	Engine Vector	Priority Vector
A1	0.03	0.03	0.02	0.03	0.03	0.03	0.06	0.04	0.04	0.03	0.02	0.04	0.05	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.06	0.04	0.04	0.03	0.02	0.04	0.05	0.03	0.03	0.05	0.02	0.04	0.03	0.03	0.02	0.06	0.04	0.04	0.03	**1.38**	0.034609
A2	0.03	0.03	0.01	0.03	0.03	0.04	0.06	0.04	0.10	0.01	0.02	0.04	0.04	0.03	0.04	0.05	0.03	0.01	0.03	0.03	0.04	0.06	0.04	0.10	0.01	0.02	0.04	0.04	0.03	0.04	0.05	0.03	0.01	0.03	0.03	0.04	0.06	0.04	0.10	0.01	**1.54**	0.038591
A3	0.03	0.07	0.02	0.07	0.06	0.03	0.05	0.06	0.10	0.04	0.05	0.04	0.07	0.04	0.03	0.03	0.07	0.02	0.07	0.06	0.03	0.05	0.06	0.10	0.04	0.05	0.04	0.07	0.04	0.03	0.03	0.07	0.02	0.07	0.06	0.02	0.05	0.06	0.10	0.04	**2.01**	0.050161
A4	0.03	0.03	0.01	0.03	0.03	0.03	0.06	0.04	0.04	0.04	0.02	0.04	0.04	0.03	0.03	0.03	0.03	0.01	0.03	0.03	0.03	0.06	0.04	0.04	0.04	0.02	0.04	0.04	0.03	0.03	0.03	0.03	0.01	0.03	0.03	0.02	0.06	0.04	0.04	0.04	**1.35**	0.033830
A5	0.03	0.03	0.01	0.03	0.03	0.03	0.05	0.04	0.10	0.04	0.04	0.03	0.05	0.04	0.03	0.03	0.03	0.01	0.03	0.03	0.03	0.05	0.04	0.10	0.04	0.04	0.03	0.05	0.04	0.03	0.03	0.03	0.01	0.03	0.03	0.02	0.05	0.04	0.10	0.04	**1.58**	0.039377
A6	0.08	0.07	0.06	0.10	0.09	0.08	0.07	0.05	0.16	0.05	0.05	0.05	0.06	0.04	0.04	0.08	0.07	0.06	0.10	0.09	0.08	0.07	0.05	0.16	0.05	0.05	0.05	0.06	0.04	0.04	0.08	0.07	0.06	0.10	0.09	0.15	0.07	0.05	0.16	0.05	**3.00**	0.074963
A7	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.03	0.00	0.03	0.04	0.03	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.03	0.00	0.03	0.04	0.03	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.03	**0.55**	0.013712
A8	0.00	0.01	0.00	0.01	0.00	0.01	0.03	0.01	0.02	0.03	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.00	0.01	0.00	0.01	0.03	0.01	0.02	0.03	0.01	0.03	0.03	0.03	0.03	0.00	0.01	0.00	0.01	0.00	0.01	0.03	0.01	0.02	0.03	**0.63**	0.015661
A9	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.02	0.04	0.01	0.02	0.05	0.03	0.03	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.02	0.04	0.01	0.02	0.05	0.03	0.03	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.02	0.04	**0.67**	0.016736
A10	0.01	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.05	0.01	0.03	0.01	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.05	0.01	0.03	0.01	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	**0.38**	0.009565
A11	0.01	0.02	0.00	0.02	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.04	0.05	0.03	0.04	0.01	0.02	0.00	0.02	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.04	0.05	0.03	0.04	0.01	0.02	0.00	0.02	0.01	0.01	0.03	0.01	0.02	0.01	**0.75**	0.018674
A12	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01	**0.25**	0.006134
A13	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.18**	0.004406
A14	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.20**	0.004908
A15	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.21**	0.005233
A16	0.03	0.01	0.09	0.03	0.01	0.04	0.02	0.04	0.02	0.04	0.05	0.04	0.04	0.02	0.03	0.03	0.01	0.09	0.03	0.01	0.04	0.02	0.04	0.02	0.04	0.05	0.04	0.04	0.02	0.03	0.03	0.01	0.08	0.03	0.01	0.04	0.02	0.04	0.02	0.04	**1.33**	0.033221
A17	0.08	0.03	0.11	0.02	0.03	0.04	0.05	0.04	0.01	0.04	0.04	0.02	0.02	0.03	0.03	0.08	0.03	0.11	0.02	0.03	0.04	0.05	0.04	0.01	0.04	0.04	0.02	0.02	0.03	0.03	0.08	0.03	0.11	0.02	0.03	0.04	0.05	0.04	0.01	0.04	**1.61**	0.040347
A18	0.01	0.01	0.02	0.03	0.01	0.03	0.01	0.04	0.02	0.01	0.05	0.04	0.02	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.03	0.01	0.04	0.02	0.01	0.05	0.04	0.02	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.02	0.01	0.04	0.02	0.01	**0.91**	0.022730
A19	0.03	0.07	0.02	0.03	0.09	0.04	0.05	0.03	0.01	0.04	0.04	0.02	0.02	0.04	0.03	0.03	0.07	0.02	0.03	0.09	0.04	0.05	0.03	0.01	0.04	0.04	0.02	0.02	0.04	0.03	0.03	0.07	0.02	0.03	0.09	0.04	0.05	0.03	0.01	0.04	**1.51**	0.037760
A20	0.08	0.03	0.04	0.01	0.03	0.04	0.02	0.04	0.01	0.02	0.04	0.03	0.05	0.02	0.03	0.08	0.03	0.04	0.01	0.03	0.04	0.02	0.04	0.01	0.02	0.04	0.03	0.05	0.02	0.03	0.08	0.03	0.04	0.01	0.03	0.04	0.02	0.04	0.01	0.02	**1.32**	0.032878
A21	0.06	0.07	0.06	0.07	0.06	0.03	0.08	0.06	0.04	0.06	0.06	0.05	0.06	0.05	0.04	0.05	0.07	0.06	0.07	0.06	0.08	0.08	0.06	0.04	0.06	0.06	0.05	0.06	0.05	0.04	0.05	0.07	0.06	0.07	0.06	0.04	0.08	0.06	0.04	0.06	**2.31**	0.057743
A22	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.04	0.05	0.04	0.01	0.04	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.04	0.05	0.04	0.01	0.04	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.04	**0.90**	0.022563
A23	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.26**	0.006497
A24	0.03	0.07	0.02	0.07	0.06	0.04	0.01	0.02	0.02	0.01	0.05	0.03	0.01	0.04	0.03	0.03	0.07	0.02	0.07	0.06	0.04	0.01	0.02	0.02	0.01	0.05	0.03	0.01	0.04	0.03	0.03	0.07	0.02	0.07	0.06	0.04	0.01	0.02	0.02	0.01	**1.36**	0.034042
A25	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.34**	0.008445
A26	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	**0.32**	0.007908
A27	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	**0.24**	0.005998
A28	0.01	0.02	0.01	0.02	0.00	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.01	0.02	0.00	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.01	0.02	0.00	0.01	0.01	0.02	0.02	0.01	**0.52**	0.012923
A29	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	**0.36**	0.008934
A30	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	**0.16**	0.003966
A31	0.03	0.01	0.09	0.03	0.01	0.04	0.02	0.04	0.02	0.04	0.05	0.04	0.04	0.02	0.03	0.03	0.01	0.09	0.03	0.01	0.04	0.02	0.04	0.02	0.04	0.05	0.04	0.04	0.02	0.03	0.03	0.01	0.08	0.03	0.01	0.04	0.02	0.04	0.02	0.04	**1.33**	0.033221
A32	0.08	0.03	0.11	0.02	0.03	0.04	0.05	0.04	0.01	0.04	0.04	0.02	0.02	0.03	0.03	0.08	0.03	0.11	0.02	0.03	0.04	0.05	0.04	0.01	0.04	0.04	0.02	0.02	0.03	0.03	0.08	0.03	0.11	0.02	0.03	0.04	0.05	0.04	0.01	0.04	**1.61**	0.040347
A33	0.01	0.01	0.02	0.03	0.01	0.03	0.01	0.04	0.02	0.01	0.05	0.04	0.02	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.03	0.01	0.04	0.02	0.01	0.05	0.04	0.02	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.02	0.01	0.04	0.02	0.01	**0.91**	0.022730
A34	0.03	0.07	0.02	0.03	0.09	0.04	0.05	0.03	0.01	0.04	0.04	0.02	0.02	0.04	0.03	0.03	0.07	0.02	0.03	0.09	0.04	0.05	0.03	0.01	0.04	0.04	0.02	0.02	0.04	0.03	0.03	0.07	0.02	0.03	0.09	0.04	0.05	0.03	0.01	0.04	**1.51**	0.037760
A35	0.08	0.03	0.04	0.01	0.03	0.04	0.02	0.04	0.01	0.02	0.04	0.03	0.05	0.02	0.03	0.08	0.03	0.04	0.01	0.03	0.04	0.02	0.04	0.01	0.02	0.04	0.03	0.05	0.02	0.03	0.08	0.03	0.04	0.01	0.03	0.04	0.02	0.04	0.01	0.02	**1.32**	0.032878
A36	0.06	0.07	0.06	0.07	0.06	0.08	0.08	0.06	0.04	0.06	0.06	0.05	0.06	0.05	0.04	0.05	0.07	0.06	0.07	0.06	0.04	0.08	0.06	0.04	0.06	0.06	0.05	0.06	0.05	0.04	0.05	0.07	0.06	0.07	0.06	0.07	0.08	0.06	0.04	0.06	**2.36**	0.059003
A37	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.04	0.05	0.04	0.01	0.04	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.04	0.05	0.04	0.01	0.04	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.04	**0.90**	0.022563
A38	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.26**	0.006497
A39	0.03	0.07	0.02	0.07	0.06	0.04	0.01	0.02	0.02	0.01	0.05	0.03	0.01	0.04	0.03	0.03	0.07	0.02	0.07	0.06	0.04	0.01	0.02	0.02	0.01	0.05	0.03	0.01	0.04	0.03	0.03	0.07	0.02	0.07	0.06	0.04	0.01	0.02	0.02	0.01	**1.36**	0.034042
A40	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	**0.34**	0.008445

APPENDIX C

AHP INTERVIEW GUIDELINES

SECTION A: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The following questions are used to confirm your background and suitability as an expert. After validation, your response will be kept anonymous and all panels will be treated with high level of confidentiality.

1. **Please complete/tick (√) one answer from the following background information.**

Personal Information

Name: ______________________________

Organization: ______________________________

Position : ______________________________

Work Experience: ☐ Less than 01year ☐ 02-05 years ☐ 06-10 years ☐ More than 10years

Age : ☐ Less than 20 ☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50 and Above

Gender : ☐ Male ☐ Female

Education Level : ☐ Diploma ☐ Bachelors ☐ Masters ☐ Doctorate ☐ Other________

City: ______________________________

State: ______________________________

Professional Information

Please indicate level of your experience and knowledge in the Construction Industry and Lean Management Tools based on your field of profession.

Construction Industry : ☐ Poor ☐ Fair ☐ Good ☐ Highly Experienced

Lean Management Tools : ☐ Poor ☐ Fair ☐ Good ☐ Highly Knowledgeable

SECTION B: PAIR-WISE COMPARISON FOR CRITERIA (DELAY SOURCES)

Purpose:

This section elicits expert's opinion and agreement with the specific Delay Sources (Criteria) considered to be more important (or more preferred than others) in Malaysian's Construction Industry.

2. To what extent do you agree with these criteria to have influence on performance of Malaysian Construction Industry? Please use a scale of 1-9 for the comparison to determine the degree of importance, as shown below;

Internal Sources of Delays (4P Factors)

Criteria versus Criteria

Scale	Explanation
1	Equal Significance
3	Moderate Significance
5	Strongly Significant
7	Very Strongly Significant
9	Extremely Significant
2,4,6,8	Intermediary Values between the two adjacent judgements

Directions:

If Variable i – Significant than Variable j, please use (+) **3,5,7,9**

If Variable j – Significant than Variable i, please use (-) **3,5,7,9**

If Variable i Equal to Variable j and/or j Equal to i, Please use 1

i	j →	1. Project/Scope Related Delays	2. Project Management Related Delays	3. Project Participants Related Delays	4. Procurement Related Delays
i	= 1	$j_{1...4}$			
1. Project/Scope Related Delays	$i_{1...4}$				
2. Project Management Related Delays					
3. Project Participants Related Delays					
4. Procurement Related Delays					

3. To what extent do you agree with these criteria to have influence on performance of Malaysian Construction Industry? Please use a scale of 1-9 for the comparison to determine the degree of importance, as shown below;

External Sources of Delays (PESTLE Factors)

Criteria versus Criteria

Scale	Explanation
1	Equal Significance
3	Moderate Significance
5	Strongly Significant
7	Very Strongly Significant
9	Extremely Significant
2,4,6,8	Intermediary Values between the two adjacent judgements

Directions:
If Variable i Significant than Variable j, please use (+) **3,5,7,9**

If Variable j – Significant than Variable i, please use (–) **3,5,7,9**

If Variable i – Equal to Variable j and/or j – Equal to i, Please use **1**

i	j	1. Political Sources	2. Economic Sources	3. Social Sources	4. Technological Sources	5. Legal Sources	6. Environmental (Physical) Sources
	= 1	$j_{1...4}$					
1. Political Sources	$I_{1...4}$						
2. Economic Sources							
3. Social Sources							
4. Technological Sources							
5. Legal Sources							
6. Environmental (Physical) Sources							

SECTION C: PAIR-WISE COMPARISON FOR ALTERNATIVES (LEAN TOOLS)

Purpose:

The purpose of this section is to obtain expert's opinion on the most important or favorable Lean Tools (Alternatives) for controlling Delays (Criteria) in Malaysian's Construction Industry.

Below are a series of 10 different questions (from Question 4 to Question 13) comprising of four (4) Internal Delay Sources (Criteria) and six (6) External Delay Sources (Criteria) under this section. Each set of question follows the same format. In each set, you will be asked to indicate the extent to which one variable is important than the other(s). There is a glossary provided at the end of this document to clarify terms.

General Question for Question 4 – 13.

From your experience in the construction field, Which Lean Tool (Alternative) do you prefer under the Criteria respectively (4 - 13)? Please use the below preference scale 1-9.

Preference Scaling

Scale	Explanation
1	Equal Significance
3	Moderate Significance
5	Strongly Significant
7	Very Strongly Significant
9	Extremely Significant
2,4,6,8	Intermediary Values between the two adjacent judgements

Directions:

If Variable i – Significant than Variable j, please use (+) **3,5,7,9**

If Variable j – Significant than Variable i, please use (–) **3,5,7,9**

If Variable i – Equal to Variable j and/or j – Equal to i, Please use **1**

Question 4

Criteria: Project Scope

Directions:
If Variable i Significant than Variable j, please use (+) 3,5,7,9
If Variable j Significant than Variable i, please use (−) 3,5,7,9
If Variable i Equal to Variable j and/or j Equal to i. Please use 1
For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8

j		Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analysis	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
i	1	$j_{1...40}$																																							
Fail Safe for Quality	$i_{1...40}$																																								
Construction Process Analysis																																									
5S																																									
Work Structuring																																									
Statistical Process Control																																									
Concurrent Engineering																																									
Muda Walk																																									
5 Whys																																									
Synchronize/Line Balancing																																									
Heijunka (Level Scheduling)																																									
Failure Mode and Effects Analysis																																									
Team Preparation																																									
SMART Goals																																									
Total Productive Maintenance (TPM)																																									
Time and Motion Study																																									
Value Stream Mapping																																									
Just-In-Time																																									
First Run Studies																																									
Pareto Analysis																																									
Continuous Flow																																									
Last Planner System (LPS)																																									
Check Sheet																																									
Kaizen																																									
FIFO line (First In, First Out)																																									
Set up reduction																																									
Bottleneck Analysis																																									
Suggestion schemes																																									
Multi Process Handling																																									
Check Points & Control Points																																									
Preventive Maintenance																																									
Kanban (Pull System)																																									
Work Standardization																																									
Visual Management																																									
Poka-Yoke (Error Proofing)																																									
Six Sigma																																									
Daily Huddle Meetings																																									
Root Cause Analysis																																									
PDCA (Plan, Do, Check, Act)																																									
Jidoka/Autonomation																																									
Quality Function Development (QFD)																																									

6

Question 5

Criteria: Project Management **Directions:** If Variable i Significant than Variable j, please use (+) 3,5,7,9 If Variable j – Significant than Variable i please use (–) 3,5,7,9 If Variable i Equal to Variable j and/or j – Equal to i Please use 1 For intermediary Values between the two adjacent judgements use (+/-) 2, 4,	j	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analy	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
i	1																				j1...40																				
Fail Safe for Quality	i1...40																																								
Construction Process Analysis																																									
5S																																									
Work Structuring																																									
Statistical Process Control																																									
Concurrent Engineering																																									
Muda Walk																																									
5 Whys																																									
Synchronize/Line Balancing																																									
Heijunka (Level Scheduling)																																									
Failure Mode and Effects Analysis																																									
Team Preparation																																									
SMART Goals																																									
Total Productive Maintenance (TPM)																																									
Time and Motion Study																																									
Value Stream Mapping																																									
Just-In-Time																																									
First Run Studies																																									
Pareto Analysis																																									
Continuous Flow																																									
Last Planner System (LPS)																																									
Check Sheet																																									
Kaizen																																									
FIFO line (First In, First Out)																																									
Set up reduction																																									
Bottleneck Analysis																																									
Suggestion schemes																																									
Multi Process Handling																																									
Check Points & Control Points																																									
Preventive Maintenance																																									
Kanban (Pull System)																																									
Work Standardization																																									
Visual Management																																									
Poka-Yoke (Error Proofing)																																									
Six Sigma																																									
Daily Huddle Meetings																																									
Root Cause Analysis																																									
PDCA (Plan, Do, Check, Act)																																									
Jidoka/Autonomation																																									
Quality Function Development (QFD)																																									

Question 6

Criteria: Project Participants

Directions:
If Variable i - Significant than Variable j, please use (+) 3,5,7,9
If Variable j – Significant than Variable i, please use (–) 3,5,7,9
If Variable i - Equal to Variable j and/or j – Equal to i, Please use 1
For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8

j: 1, j1...40; i: i1...40

i \ j	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analy	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO Line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
Fail Safe for Quality																																								
Construction Process Analysis																																								
5S																																								
Work Structuring																																								
Statistical Process Control																																								
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Quality Function Development (QFD)																																								

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Question 7

Criteria: Procurement

Directions:
If Variable i Significant than Variable j, please use (+) 3,5,7,9
If Variable j Significant than Variable i, please use (-) 3,5,7,9
If Variable i Equal to Variable j and/or j Equal to i, Please use 1
For intermediary Values between the two adjacent judgements use (+/-) 2,4,6 & 8

	j	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analy	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
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Quality Function Development (QFD)																																									

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Question 8

Criteria: Political

Directions:
If Variable i – Significant than Variable j, please use (+) 3,5,7,9
If Variable j – Significant than Variable i, please use (–) 3,5,7,9
If Variable i - Equal to Variable j and/or j Equal to i. Please use 1
For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8

i \ j	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analysis	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
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10

Question 9

Criteria: Economic

Directions:
If Variable i Significant than Variable j, please use (+) 3,5,7,9
If Variable j - Significant than Variable i, please use (-) 3,5,7,9
If Variable i – Equal to Variable j and/or j – Equal to i, Please use 1
For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8

i \ j ($j_{1...40}$; $i_{1...40}$)	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analysis	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
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Quality Function Development (QFD)																																								

11

Question 10

Criteria: Social **Directions:** If Variable i – Significant than Variable j, please use (+) 3,5,7,9 If Variable j - Significant than Variable i, please use (-) 3,5,7,9 If Variable i – Equal to Variable j and/or j – Equal to i. Please use 1 For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8	j	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analysis	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
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Question 11

Criteria: Technological Directions: If Variable i – Significant than Variable j, please use (+) 3,5,7,9 If Variable j – Significant than Variable i, please use (–) 3,5,7,9 If Variable i – Equal to Variable j and/or j – Equal to i, Please use 1 For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8	j	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analysis	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
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Quality Function Development (QFD)																																									

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Criteria: Legal

Directions:
If Variable i Significant than Variable j, please use (+) 3,5,7,9
If Variable j – Significant than Variable i, please use (–) 3,5,7,9
If Variable i Equal to Variable j and/or j Equal to i, Please use 1
For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8

i \ j (1; $j_{1...40}$)	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analysis	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Automomation	Quality Function Development
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Quality Function Development (QFD)																																								

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Criteria: Environmental (Physical)

Directions:
If Variable i – Significant than Variable j, please use (+) 3,5,7,9
If Variable j Significant than Variable i, please use (–) 3,5,7,9
If Variable i – Equal to Variable j and/or j – Equal to i. Please use 1
For intermediary Values between the two adjacent judgements use (+/-) 2, 4, 6 & 8

i	j	Fail Safe for Quality	Construction Process Analysis	5S	Work Structuring	Statistical Process Control	Concurrent Engineering	Muda Walk	5 Whys	Synchronize/Line Balancing	Heijunka (Level Scheduling)	Failure Mode and Effects Analysis	Team Preparation	SMART Goals	Total Productive Maintenance	Time and Motion Study	Value Stream Mapping	Just-In-Time	First Run Studies	Pareto Analysis	Continuous Flow	Last Planner System	Check Sheet	Kaizen	FIFO line (First In, First Out)	Set up reduction	Bottleneck Analysis	Suggestion schemes	Multi Process Handling	Check Points & Control Points	Preventive Maintenance	Kanban (Pull System)	Work Standardization	Visual Management	Poka-Yoke (Error Proofing)	Six Sigma	Daily Huddle Meetings	Root Cause Analysis	PDCA (Plan, Do, Check, Act)	Jidoka/Autonomation	Quality Function Development
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SECTION D: CONCLUSION AND RECOMMENDATION

1. Based on your experience, what are the relevant and suitable Lean Tools for the Construction Industry?

2. Based on your expertise on the area under research, kindly indicate suggestions to improve the Malaysian's Construction Industry?

THANK YOU FOR YOUR COOPERATION. ________END________

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APPENDIX D

DATA ANALYSIS TABLES

Table 4.8 Priorities and Consistency Indexes for Criteria 1

Project Scope			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.37	0.034130	1.649529	48.33
A2	1.38	0.034413	1.829770	53.17
A3	1.97	0.049187	2.549995	51.84
A4	1.43	0.035723	1.896208	53.08
A5	1.45	0.036185	2.354883	65.08
A6	2.65	0.066316	4.000932	60.33
A7	0.49	0.012330	2.235005	181.26
A8	0.56	0.014101	1.919920	136.16
A9	0.58	0.014470	1.820771	125.83
A10	0.43	0.010708	1.174571	109.69
A11	0.58	0.014533	1.154530	79.44
A12	0.22	0.005492	0.209272	38.11
A13	0.21	0.005302	0.184427	34.78
A14	0.21	0.005339	0.167245	31.33
A15	0.26	0.006405	0.179079	27.96
A16	1.37	0.034130	1.044431	30.60
A17	1.38	0.034413	1.120710	32.57
A18	1.97	0.049187	1.518052	30.86
A19	1.43	0.035723	1.057539	29.60
A20	1.45	0.036185	1.250440	34.56
A21	2.76	0.069101	2.174779	31.47
A22	0.48	0.012046	1.112427	92.35
A23	0.58	0.014454	0.968367	67.00
A24	0.56	0.014101	0.875270	62.07
A25	0.43	0.010708	0.584982	54.63
A26	0.58	0.014533	0.576383	39.66
A27	0.22	0.005492	0.097099	17.68
A28	0.21	0.005302	0.082071	15.48
A29	0.21	0.005339	0.072529	13.58
A30	0.26	0.006405	0.068723	10.73
A31	1.37	0.034130	0.441464	12.93
A32	1.38	0.034413	0.409085	11.89
A33	1.97	0.049187	0.483145	9.82
A34	1.43	0.035723	0.217592	6.09
A35	1.45	0.036185	0.143370	3.96

A36	2.69	0.067316	0.304535		4.52
A37	0.49	0.012142	0.009409		0.77
A38	0.57	0.014220	0.009115		0.64
A39	0.57	0.014225	0.008199		0.58
A40	0.43	0.010708	0.002142		0.20
		1.000000	37.96	Average	42.76641607

λmax	42.77
RI	1.7
CI	0.071025641
CR	0.041779789
	4.18%

Table 4.9 Priorities and Consistency Indexes for Criteria 2

Project Management			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.34	0.033594	1.626895	48.43
A2	1.44	0.035925	2.123907	59.12
A3	1.91	0.047848	2.604875	54.44
A4	1.28	0.032122	2.086364	64.95
A5	1.45	0.036286	2.545447	70.15
A6	2.91	0.072787	4.084459	56.12
A7	0.49	0.012255	2.084945	170.13
A8	0.56	0.014021	1.985719	141.62
A9	0.61	0.015321	2.167867	141.50
A10	0.36	0.009040	0.687455	76.05
A11	0.68	0.016968	1.304683	76.89
A12	0.24	0.005941	0.389425	65.55
A13	0.18	0.004382	0.161557	36.87
A14	0.20	0.004965	0.158024	31.82
A15	0.21	0.005199	0.151803	29.20
A16	1.27	0.031818	0.980411	30.81
A17	1.44	0.035925	1.289540	35.90
A18	1.91	0.047848	1.538921	32.16
A19	1.28	0.032122	1.136879	35.39
A20	1.45	0.036286	1.345248	37.07
A21	3.11	0.077772	2.242437	28.83
A22	0.49	0.012255	1.028900	83.96
A23	0.56	0.014021	0.975390	69.57
A24	0.61	0.015321	1.063076	69.39
A25	0.36	0.009040	0.340701	37.69

A26	0.68	0.016968	0.648043	38.19
A27	0.24	0.005941	0.173598	29.22
A28	0.18	0.004382	0.068582	15.65
A29	0.20	0.004965	0.065948	13.28
A30	0.21	0.005199	0.058553	11.26
A31	1.26	0.031423	0.397205	12.64
A32	1.44	0.035925	0.453345	12.62
A33	1.90	0.047453	0.441637	9.31
A34	1.28	0.032122	0.188848	5.88
A35	1.45	0.036286	0.144405	3.98
A36	2.79	0.069636	0.348565	5.01
A37	0.49	0.012255	0.008950	0.73
A38	0.56	0.014021	0.006531	0.47
A39	0.61	0.015321	0.009468	0.62
A40	0.36	0.009040	0.002260	0.25
		1.000000	39.12 Average	43.568

λmax	43.57
RI	1.7
CI	0.091538462
CR	0.053846154
	5.38%

Table 4.10 Priorities and Consistency Indexes for Criteria 3

Project Participants			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	2.26	0.056398	2.690024	47.70
A2	1.27	0.031689	2.042619	64.46
A3	1.58	0.039429	2.335714	59.24
A4	1.54	0.038554	2.420549	62.78
A5	1.35	0.033770	2.452012	72.61
A6	2.65	0.066287	3.898478	58.81
A7	0.50	0.012393	2.222947	179.38
A8	0.41	0.010219	1.450403	141.93
A9	0.47	0.011688	1.531394	131.02
A10	0.34	0.008543	0.675810	79.11
A11	0.61	0.015338	1.138849	74.25
A12	0.47	0.011680	0.846800	72.50
A13	0.18	0.004439	0.148643	33.48
A14	0.19	0.004740	0.151482	31.96
A15	0.18	0.004447	0.126965	28.55
A16	2.20	0.055032	1.696284	30.82

A17	1.27	0.031689	1.203721		37.99
A18	1.58	0.039429	1.321798		33.52
A19	1.54	0.038554	1.316796		34.15
A20	1.35	0.033770	1.279248		37.88
A21	2.55	0.063798	2.024979		31.74
A22	0.50	0.012393	1.108327		89.43
A23	0.41	0.010219	0.722751		70.72
A24	0.47	0.011688	0.760753		65.09
A25	0.34	0.008543	0.337781		39.54
A26	0.61	0.015338	0.568169		37.04
A27	0.47	0.011680	0.383932		32.87
A28	0.18	0.004439	0.060808		13.70
A29	0.19	0.004740	0.059964		12.65
A30	0.18	0.004447	0.051508		11.58
A31	2.29	0.057210	0.845069		14.77
A32	1.27	0.031689	0.354243		11.18
A33	1.58	0.039429	0.299480		7.60
A34	1.54	0.038554	0.204641		5.31
A35	1.35	0.033770	0.100260		2.97
A36	2.45	0.061161	0.169398		2.77
A37	0.50	0.012393	0.007809		0.63
A38	0.41	0.010219	0.006107		0.60
A39	0.47	0.011657	0.003755		0.32
A40	0.34	0.008543	0.001424		0.17
		1.000000	39.02	Average	44.071
		λmax	44.07		
		RI	1.7		
		CI	0.104358974		
		CR	0.061387632		
			6.14%		

Table 4.11 Priorities and Consistency Indexes for Criteria 4

Procurement			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.46	0.036552	1.757007	48.07
A2	2.18	0.054424	2.952949	54.26
A3	1.23	0.030688	1.844051	60.09
A4	1.44	0.036121	2.404355	66.56
A5	1.59	0.039820	2.544906	63.91
A6	2.74	0.068599	4.239855	61.81

A7	0.55	0.013824	1.803122	130.43
A8	0.52	0.013018	1.715408	131.78
A9	0.21	0.005164	0.401924	77.84
A10	0.38	0.009542	0.713172	74.74
A11	0.57	0.014328	0.968784	67.61
A12	0.61	0.015147	1.052384	69.48
A13	0.20	0.004991	0.262630	52.62
A14	0.39	0.009657	0.374073	38.74
A15	0.19	0.004752	0.163342	34.37
A16	1.32	0.033037	0.968860	29.33
A17	2.16	0.054050	1.787430	33.07
A18	1.23	0.030688	1.033692	33.68
A19	1.44	0.036121	1.326060	36.71
A20	1.44	0.035921	1.311559	36.51
A21	2.69	0.067140	2.245230	33.44
A22	0.55	0.013824	0.899402	65.06
A23	0.52	0.013018	0.854761	65.66
A24	0.21	0.005164	0.200868	38.90
A25	0.38	0.009542	0.356780	37.39
A26	0.57	0.014328	0.482976	33.71
A27	0.61	0.015147	0.496130	32.75
A28	0.20	0.004991	0.118754	23.79
A29	0.39	0.009657	0.154927	16.04
A30	0.19	0.004752	0.066597	14.01
A31	1.34	0.033411	0.363162	10.87
A32	2.16	0.054050	0.665580	12.31
A33	1.23	0.030688	0.227569	7.42
A34	1.44	0.036121	0.248327	6.87
A35	1.44	0.035921	0.104824	2.92
A36	2.57	0.064254	0.281021	4.37
A37	0.55	0.013824	0.008614	0.62
A38	0.52	0.013018	0.006673	0.51
A39	0.21	0.005164	0.002623	0.51
A40	0.38	0.009542	0.003181	0.33
		1.000000	37.41	Average 40.228

λmax	40.23
RI	1.7
CI	0.005897436
CR	0.00346908
	0.35%

Table 4.12 Overall Priorities and Ranking for Model I

Alternatives	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Overall Priority Vector
A1	0.034130	0.033594	0.056398	0.036552	0.160675
A2	0.034413	0.035925	0.031689	0.054424	0.156452
A3	0.049187	0.047848	0.039429	0.030688	0.167153
A4	0.035723	0.032122	0.038554	0.036121	0.142520
A5	0.036185	0.036286	0.033770	0.039820	0.146061
A6	0.066316	0.072787	0.066287	0.068599	0.273989
A7	0.012330	0.012255	0.012393	0.013824	0.050802
A8	0.014101	0.014021	0.010219	0.013018	0.051358
A9	0.014470	0.015321	0.011688	0.005164	0.046643
A10	0.010708	0.009040	0.008543	0.009542	0.037832
A11	0.014533	0.016968	0.015338	0.014328	0.061167
A12	0.005492	0.005941	0.011680	0.015147	0.038259
A13	0.005302	0.004382	0.004439	0.004991	0.019114
A14	0.005339	0.004965	0.004740	0.009657	0.024701
A15	0.006405	0.005199	0.004447	0.004752	0.020803
A16	0.034130	0.031818	0.055032	0.033037	0.154018
A17	0.034413	0.035925	0.031689	0.054050	0.156077

A18	0.049187	0.047848	0.039429	0.030688	0.167153
A19	0.035723	0.032122	0.038554	0.036121	0.142520
A20	0.036185	0.036286	0.033770	0.035921	0.142162
A21	0.069101	0.077772	0.063798	0.067140	0.277812
A22	0.012046	0.012255	0.012393	0.013824	0.050518
A23	0.014454	0.014021	0.010219	0.013018	0.051712
A24	0.014101	0.015321	0.011688	0.005164	0.046274
A25	0.010708	0.009040	0.008543	0.009542	0.037832
A26	0.014533	0.016968	0.015338	0.014328	0.061167
A27	0.005492	0.005941	0.011680	0.015147	0.038259
A28	0.005302	0.004382	0.004439	0.004991	0.019114
A29	0.005339	0.004965	0.004740	0.009657	0.024701
A30	0.006405	0.005199	0.004447	0.004752	0.020803
A31	0.034130	0.031423	0.057210	0.033411	0.156175
A32	0.034413	0.035925	0.031689	0.054050	0.156077
A33	0.049187	0.047453	0.039429	0.030688	0.166758
A34	0.035723	0.032122	0.038554	0.036121	0.142520
A35	0.036185	0.036286	0.033770	0.035921	0.142162

A36	0.067316	0.069636	0.061161	0.064254	0.262368
A37	0.012142	0.012255	0.012393	0.013824	0.050613
A38	0.014220	0.014021	0.010219	0.013018	0.051477
A39	0.014225	0.015321	0.011657	0.005164	0.046367
A40	0.010708	0.009040	0.008543	0.009542	0.037832
	1.000000	1.000000	1.000000	1.000000	

Table 4.13 Priorities and Consistency Indexes for Criteria 1

Political Sources			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.39	0.034696	1.726412	49.76
A2	1.53	0.038268	2.615995	68.36
A3	1.96	0.048979	2.942016	60.07
A4	1.34	0.033535	2.215048	66.05
A5	1.53	0.038185	2.628625	68.84
A6	2.92	0.073027	3.932310	53.85
A7	0.48	0.012104	1.909870	157.78
A8	0.58	0.014403	1.837461	127.57
A9	0.63	0.015848	1.797661	113.43
A10	0.36	0.009116	0.713146	78.23
A11	0.71	0.017713	1.252235	70.70
A12	0.23	0.005750	0.364163	63.33
A13	0.17	0.004248	0.166872	39.28
A14	0.19	0.004786	0.163256	34.11
A15	0.20	0.004965	0.151325	30.48
A16	2.67	0.066672	1.970144	29.55
A17	1.50	0.037613	1.448783	38.52
A18	0.92	0.022911	0.983874	42.94
A19	1.29	0.032339	1.103596	34.13
A20	1.11	0.027834	1.269042	45.59
A21	2.30	0.057484	1.610928	28.02
A22	0.68	0.017095	1.334897	78.09
A23	0.63	0.015700	0.990815	63.11

A24	0.57	0.014291	0.898227		62.85
A25	0.27	0.006806	0.249046		36.59
A26	0.97	0.024277	0.624131		25.71
A27	0.34	0.008620	0.214401		24.87
A28	0.22	0.005527	0.081097		14.67
A29	0.16	0.003953	0.053614		13.56
A30	0.18	0.004609	0.062086		13.47
A31	2.67	0.066672	0.860284		12.90
A32	1.50	0.037511	0.436693		11.64
A33	0.92	0.022911	0.187908		8.20
A34	1.29	0.032339	0.160602		4.97
A35	1.11	0.027834	0.085056		3.06
A36	2.30	0.057484	0.173484		3.02
A37	0.68	0.017095	0.013973		0.82
A38	0.63	0.015700	0.014111		0.90
A39	0.57	0.014291	0.004083		0.29
A40	0.27	0.006806	0.001361		0.20
		1.000000	39.25	Average	41.988
		λmax	41.99		
		RI	1.7		
		CI	0.051025641		
		CR	0.030015083		
			3.00%		

Table 4.14 Priorities and Consistency Indexes for Criteria 2

Economic Sources			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.32	0.033083	1.675345	50.64
A2	1.43	0.035636	2.391338	67.10
A3	1.89	0.047279	2.859170	60.47
A4	1.28	0.032073	2.245999	70.03
A5	1.44	0.035911	2.587264	72.05
A6	2.86	0.071454	4.061553	56.84
A7	0.50	0.012566	2.062646	164.15
A8	0.57	0.014350	1.868006	130.17
A9	0.63	0.015642	2.038775	130.34
A10	0.36	0.008894	0.674546	75.84
A11	0.68	0.016980	1.315553	77.48
A12	0.23	0.005853	0.392453	67.05
A13	0.17	0.004173	0.171093	41.00
A14	0.19	0.004779	0.160040	33.49

A15	0.20	0.005030	0.148429		29.51
A16	1.32	0.033083	1.001167		30.26
A17	1.43	0.035636	1.549911		43.49
A18	1.89	0.047279	1.793973		37.94
A19	1.28	0.032073	1.298441		40.48
A20	1.44	0.035911	1.390611		38.72
A21	2.90	0.072381	2.211746		30.56
A22	0.50	0.012566	1.028471		81.85
A23	0.57	0.014350	0.885957		61.74
A24	0.63	0.015642	0.966693		61.80
A25	0.36	0.008894	0.329298		37.02
A26	0.68	0.016980	0.662106		38.99
A27	0.23	0.005853	0.181371		30.99
A28	0.17	0.004173	0.079026		18.94
A29	0.19	0.004779	0.069066		14.45
A30	0.20	0.005030	0.057353		11.40
A31	2.66	0.066540	0.916101		13.77
A32	1.21	0.030267	0.388169		12.82
A33	1.68	0.041970	0.541644		12.91
A34	1.05	0.026148	0.117329		4.49
A35	1.07	0.026666	0.104033		3.90
A36	2.44	0.060975	0.273568		4.49
A37	0.61	0.015368	0.016617		1.08
A38	0.41	0.010322	0.008747		0.85
A39	0.51	0.012872	0.008399		0.65
A40	0.82	0.020541	0.004108		0.20
		1.000000	40.54	Average	43.999
		λmax	44.00		
		RI	1.7		
		CI	0.102564103		
		CR	0.060331825		
			5.26%		

Table 4.15 Priorities and Consistency Indexes for Criteria 3

Social Sources			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.40	0.035012	1.664171	47.53
A2	1.47	0.036794	2.376778	64.60
A3	1.91	0.047642	2.736773	57.44
A4	1.32	0.032999	2.191236	66.40

A5	1.47	0.036641	2.674768	73.00
A6	2.95	0.073671	4.123413	55.97
A7	0.51	0.012696	2.127319	167.56
A8	0.58	0.014494	1.853535	127.88
A9	0.64	0.016034	2.008996	125.30
A10	0.35	0.008841	0.619299	70.04
A11	0.70	0.017404	1.175032	67.52
A12	0.24	0.005976	0.354599	59.33
A13	0.17	0.004301	0.161188	37.48
A14	0.20	0.004915	0.157122	31.97
A15	0.21	0.005250	0.151919	28.94
A16	2.10	0.052563	1.576491	29.99
A17	1.19	0.029860	1.084620	36.32
A18	1.83	0.045724	1.585518	34.68
A19	1.35	0.033859	1.106389	32.68
A20	1.30	0.032393	1.280244	39.52
A21	2.56	0.063905	2.126360	33.27
A22	0.43	0.010811	0.900448	83.29
A23	0.53	0.013238	0.707843	53.47
A24	0.48	0.011878	0.652269	54.92
A25	0.34	0.008601	0.307196	35.72
A26	0.61	0.015231	0.410832	26.97
A27	0.43	0.010709	0.311791	29.12
A28	0.17	0.004335	0.068887	15.89
A29	0.29	0.007151	0.100845	14.10
A30	0.17	0.004241	0.055056	12.98
A31	2.10	0.052563	0.664215	12.64
A32	1.19	0.029860	0.324666	10.87
A33	1.83	0.045724	0.435931	9.53
A34	1.35	0.033859	0.160206	4.73
A35	1.30	0.032393	0.114923	3.55
A36	2.56	0.063905	0.218225	3.41
A37	0.43	0.010811	0.008288	0.77
A38	0.53	0.013238	0.006302	0.48
A39	0.48	0.011878	0.004130	0.35
A40	0.34	0.008601	0.002867	0.33
		1.000000	38.59 Average	41.514

λmax	41.51
RI	1.7
CI	0.038717949
CR	0.022775264
	2.28%

Table 4.16 Priorities and Consistency Indexes for Criteria 4

Technological Sources			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.42	0.035429	1.775219	50.11
A2	1.43	0.035768	1.887353	52.77
A3	1.92	0.047896	2.616137	54.62
A4	1.44	0.035941	2.002268	55.71
A5	1.46	0.036596	2.412983	65.94
A6	2.65	0.066306	3.981392	60.05
A7	0.52	0.012919	1.995523	154.47
A8	0.59	0.014838	1.813599	122.22
A9	0.60	0.014958	1.705889	114.05
A10	0.44	0.011119	1.162213	104.53
A11	0.61	0.015291	1.199329	78.43
A12	0.22	0.005410	0.214625	39.67
A13	0.21	0.005203	0.181278	34.84
A14	0.21	0.005307	0.173613	32.71
A15	0.26	0.006458	0.180933	28.02
A16	1.66	0.041462	1.315642	31.73
A17	1.49	0.037295	1.875843	50.30
A18	1.70	0.042463	1.332467	31.38
A19	1.75	0.043672	1.458025	33.39
A20	0.73	0.018289	0.854733	46.74
A21	2.53	0.063318	2.034087	32.12
A22	0.55	0.013864	0.923000	66.57
A23	0.88	0.021968	1.269052	57.77
A24	0.38	0.009396	0.518213	55.15
A25	0.68	0.016897	0.817788	48.40
A26	0.19	0.004855	0.131197	27.02
A27	0.34	0.008518	0.174046	20.43
A28	0.29	0.007207	0.192790	26.75
A29	0.31	0.007745	0.125653	16.22
A30	0.20	0.004988	0.092306	18.51
A31	1.66	0.041462	0.582283	14.04
A32	1.49	0.037295	0.730783	19.59
A33	1.70	0.042463	0.371285	8.74
A34	1.75	0.043672	0.356456	8.16
A35	0.73	0.018289	0.038612	2.11
A36	2.53	0.063318	0.250887	3.96
A37	0.55	0.013864	0.012425	0.90
A38	0.88	0.021968	0.017540	0.80

A39	0.38	0.009396	0.004695		0.50
A40	0.68	0.016897	0.008448		0.50
		1.000000	38.79	Average	41.748

λmax	41.75
RI	1.7
CI	0.044871795
CR	0.026395173
	2.64%

Table 4.17 Priorities and Consistency Indexes for Criteria 5

Legal Sources			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	2.39	0.059717	2.895219	48.48
A2	1.28	0.032096	1.785367	55.63
A3	1.60	0.039959	2.377096	59.49
A4	1.50	0.037481	2.369272	63.21
A5	1.38	0.034526	2.451319	71.00
A6	2.63	0.065814	3.851429	58.52
A7	0.51	0.012784	2.218883	173.57
A8	0.41	0.010296	1.544545	150.01
A9	0.48	0.011945	1.581215	132.37
A10	0.35	0.008740	0.665238	76.11
A11	0.61	0.015342	1.147644	74.80
A12	0.47	0.011755	0.765670	65.13
A13	0.17	0.004234	0.149527	35.32
A14	0.18	0.004528	0.154323	34.08
A15	0.17	0.004245	0.131476	30.98
A16	1.35	0.033789	1.028023	30.43
A17	2.17	0.054155	1.828512	33.76
A18	1.21	0.030258	1.028901	34.00
A19	1.46	0.036593	1.323905	36.18
A20	1.53	0.038280	1.312364	34.28
A21	2.59	0.064820	2.268041	34.99
A22	0.54	0.013494	0.925422	68.58
A23	0.51	0.012765	0.881074	69.02
A24	0.20	0.004982	0.203436	40.83
A25	0.37	0.009303	0.357100	38.39
A26	0.54	0.013532	0.486342	35.94
A27	0.59	0.014704	0.502923	34.20
A28	0.19	0.004803	0.121256	25.25

A29	0.38	0.009581	0.154176		16.09
A30	0.18	0.004569	0.067132		14.69
A31	1.38	0.034596	0.362995		10.49
A32	2.17	0.054155	0.704767		13.01
A33	1.21	0.030258	0.229322		7.58
A34	1.46	0.036593	0.250964		6.86
A35	1.53	0.038280	0.107415		2.81
A36	2.66	0.066486	0.285528		4.29
A37	0.54	0.013494	0.008408		0.62
A38	0.51	0.012765	0.006513		0.51
A39	0.20	0.004982	0.002547		0.51
A40	0.37	0.009303	0.003101		0.33
		1.000000	38.54	Average	43.059
		λmax	43.06		
		RI	1.7		
		CI	0.078461538		
		CR	0.046153846		
			4.62%		

Table 4.18 Priorities and Consistency Indexes for Criteria 6

Environmental Sources			Lambda(max)	
Alternatives	Eigen Vector	Priority Vector	Weighted Pairwise Comparison Matrix Rating in Each Row	Approximation of Lambda(max)
A1	1.38	0.034609	1.772826	51.22
A2	1.54	0.038591	2.232984	57.86
A3	2.01	0.050161	2.843480	56.69
A4	1.35	0.033830	1.918417	56.71
A5	1.58	0.039377	2.412200	61.26
A6	3.00	0.074963	3.907574	52.13
A7	0.55	0.013712	1.767473	128.90
A8	0.63	0.015661	1.969356	125.75
A9	0.67	0.016736	1.777525	106.21
A10	0.38	0.009565	0.936619	97.92
A11	0.75	0.018674	1.460764	78.22
A12	0.25	0.006134	0.395785	64.52
A13	0.18	0.004406	0.164211	37.27
A14	0.20	0.004908	0.144281	29.40
A15	0.21	0.005233	0.170676	32.62
A16	1.33	0.033221	0.954279	28.72
A17	1.61	0.040347	1.600425	39.67
A18	0.91	0.022730	0.909976	40.03

A19	1.51	0.037760	1.108325		29.35
A20	1.32	0.032878	1.286959		39.14
A21	2.31	0.057743	2.000771		34.65
A22	0.90	0.022563	1.302382		57.72
A23	0.26	0.006497	0.282671		43.51
A24	1.36	0.034042	0.965826		28.37
A25	0.34	0.008445	0.502827		59.54
A26	0.32	0.007908	0.290245		36.70
A27	0.24	0.005998	0.106867		17.82
A28	0.52	0.012923	0.358098		27.71
A29	0.36	0.008934	0.166908		18.68
A30	0.16	0.003966	0.060534		15.26
A31	1.33	0.033221	0.378132		11.38
A32	1.61	0.040347	0.626210		15.52
A33	0.91	0.022730	0.203274		8.94
A34	1.51	0.037760	0.263817		6.99
A35	1.32	0.032878	0.243192		7.40
A36	2.36	0.059003	0.267597		4.54
A37	0.90	0.022563	0.048312		2.14
A38	0.26	0.006497	0.009515		1.46
A39	1.36	0.034042	0.050932		1.50
A40	0.34	0.008445	0.001408		0.17
		1.000000	37.86	Average	40.340

λmax	40.34
RI	1.7
CI	0.008717949
CR	0.005128205
	0.51%

Table 4.19 Overall Priorities and Ranking

	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Overall Priority Vector
A1	0.034696	0.033083	0.035012	0.035429	0.059717	0.034609	0.232547
A2	0.038268	0.035636	0.036794	0.035768	0.032096	0.038591	0.217153
A3	0.048979	0.047279	0.047642	0.047896	0.039959	0.050161	0.281916

A4	0.033535	0.032073	0.032999	0.035941	0.037481	0.033830	0.205859
A5	0.038185	0.035911	0.036641	0.036596	0.034526	0.039377	0.221235
A6	0.073027	0.071454	0.073671	0.066306	0.065814	0.074963	0.425235
A7	0.012104	0.012566	0.012696	0.012919	0.012784	0.013712	0.076780
A8	0.014403	0.014350	0.014494	0.014838	0.010296	0.015661	0.084042
A9	0.015848	0.015642	0.016034	0.014958	0.011945	0.016736	0.091163
A10	0.009116	0.008894	0.008841	0.011119	0.008740	0.009565	0.056275
A11	0.017713	0.016980	0.017404	0.015291	0.015342	0.018674	0.101403
A12	0.005750	0.005853	0.005976	0.005410	0.011755	0.006134	0.040878
A13	0.004248	0.004173	0.004301	0.005203	0.004234	0.004406	0.026566
A14	0.004786	0.004779	0.004915	0.005307	0.004528	0.004908	0.029223
A15	0.004965	0.005030	0.005250	0.006458	0.004245	0.005233	0.031181
A16	0.066672	0.033083	0.052563	0.041462	0.033789	0.033221	0.260790
A17	0.037613	0.035636	0.029860	0.037295	0.054155	0.040347	0.234905
A18	0.022911	0.047279	0.045724	0.042463	0.030258	0.022730	0.211365
A19	0.032339	0.032073	0.033859	0.043672	0.036593	0.037760	0.216296
A20	0.027834	0.035911	0.032393	0.018289	0.038280	0.032878	0.185584

A21	0.057484	0.072381	0.063905	0.063318	0.064820	0.057743	0.379652
A22	0.017095	0.012566	0.010811	0.013864	0.013494	0.022563	0.090393
A23	0.015700	0.014350	0.013238	0.021968	0.012765	0.006497	0.084518
A24	0.014291	0.015642	0.011878	0.009396	0.004982	0.034042	0.090231
A25	0.006806	0.008894	0.008601	0.016897	0.009303	0.008445	0.058945
A26	0.024277	0.016980	0.015231	0.004855	0.013532	0.007908	0.082783
A27	0.008620	0.005853	0.010709	0.008518	0.014704	0.005998	0.054402
A28	0.005527	0.004173	0.004335	0.007207	0.004803	0.012923	0.038968
A29	0.003953	0.004779	0.007151	0.007745	0.009581	0.008934	0.042144
A30	0.004609	0.005030	0.004241	0.004988	0.004569	0.003966	0.027402
A31	0.066672	0.066540	0.052563	0.041462	0.034596	0.033221	0.295055
A32	0.037511	0.030267	0.029860	0.037295	0.054155	0.040347	0.229434
A33	0.022911	0.041970	0.045724	0.042463	0.030258	0.022730	0.206056
A34	0.032339	0.026148	0.033859	0.043672	0.036593	0.037760	0.210371
A35	0.027834	0.026666	0.032393	0.018289	0.038280	0.032878	0.176339
A36	0.057484	0.060975	0.063905	0.063318	0.066486	0.059003	0.371172
A37	0.017095	0.015368	0.010811	0.013864	0.013494	0.022563	0.093195

A38	0.015700	0.010322	0.013238	0.021968	0.012765	0.006497	0.080490
A39	0.014291	0.012872	0.011878	0.009396	0.004982	0.034042	0.087461
A40	0.006806	0.020541	0.008601	0.016897	0.009303	0.008445	0.070592
	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	

APPENDIX E

LIST OF CONTRACTORS

BIL	NAMA KONTRAKTOR
1	IJMC-KEB JOINT VENTURE
2	CTCI CORPORATION, CHIYODA CORPORATION, SYNERLITZ (MALAYSIA) SDN. BHD., MIE INDUSTRIAL SDN. BHD., CCJV P1 ENGINEERING & CONSTRUCTION SDN. BHD. CONSORTIUM
3	CONSORTIUM OF SIEMENS AG, SIEMENS MALAYSIA SDN BHD & MMC ENGINEERING SERVICES SDN BHD
4	TOYO ENGINEERING & CONSTRUCTION SDN. BHD.
5	PLL-PLSB JOINT VENTURE
6	TOS ENERGY MALAYSIA SDN. BHD.
7	HYUNDAI ENGINEERING CO., LTD.
8	SAMSUNG C&T (KL) SDN. BHD. SAMSUNG-WHESSOE-STS-SCTKL CONSORTIUM
9	MMC - SUMITOMO CONSORTIUM
10	MITSUBISHI HEAVY INDUSTRIES LTD, MHI ENERGY & ENVIRONMENT (M) S/B, APEX ENERGY S/B, PT REKAYASA INDUSTRI, REKIND MALAYSIA S/B CONSORTIUM
11	CONSTRUCTION INDUSTRIAL DEVELOPMENT BOARD (CIDB)

APPENDIX F

RESEARCH PUBLICATIONS

Conference Papers:

1. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). An Environmental Impact Framework for Evaluating Construction Projects Delays. Proceedings of the 2016 International Conference on Industrial Engineering and Operations Management Detroit, Michigan, USA, September 23-25, 2016. (***Scopus indexed conference***)

2. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). Assessment of Environmental Risks in Construction Projects: A Case of Malaysian Construction Projects. Proceedings of the 2016 International Conference on Industrial Engineering and Operations Management Detroit, Michigan, USA, September 23-25, 2016. (***Scopus indexed conference***)

3. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). Advancing Towards Delay-Free Construction Project: A Review. Proceedings of the 2016 International Conference on Industrial Engineering and Operations Management Detroit, Michigan, USA, September 23-25, 2016. (***Scopus indexed conference***)

4. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). Lean Construction Tools and Techniques. Proceedings of the 2016 International Conference on Industrial Engineering and Operations Management Detroit, Michigan, USA, September 23-25, 2016. (***Scopus indexed conference***)

5. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2015). Application of Analytic Hierarchy Process Techniques in Multi-Criteria Decision Making Problems. Proceedings of the 2015 International Conference on Operations Excellence and Service Engineering Orlando, Florida, USA, September 10-11, 2015 (pp. 146-147). IEOM Society.

6. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2015). The 4Ps: A Framework for Evaluating Projects Delays. Proceedings of Engineering Technology International Conference (ETIC 2015) 10-11 August 2015, Bali, Indonesia (2015). (***Scopus indexed conference***)

7. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2015). Lean Construction Techniques: A Framework Towards Elimination of Waste in Construction Industry. Proceedings of the 2015 International Conference on Operations Excellence and Service Engineering Orlando, Florida, USA, September 10-11, 2015, IEOM Society.

8. Nor Fillianie, Aziz, Sorooshian, Shahryar and **Ansah, R. H.,** (2015). MCDM-AHP Method in Decision Makings. 17th International Conference on Mathematical and Computational Methods in Science and Engineering (MACMESE 2015), 23-24 April 2015, Kuala Lumpur. (***Scopus indexed conference***)

9. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2015). An Environmental Impact Framework for Improving the Performance of Projects. Proceedings of the 2015 International Conference on Operations Excellence and Service Engineering Orlando, Florida, USA, September 10-11, 2015, IEOM Society.

10. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2015). Evaluating Projects Delay Sources through '4 Ps' Framework Analysis. Proceedings of the 2015 International Conference on Operations Excellence and Service Engineering Orlando, Florida, USA, September 10-11, 2015, IEOM Society.

11. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2015). Lean Construction: An Effective Approach for Project Management. Malaysian Technical Universities Conference on Engineering and Technology 2015 (MUCET), 11-13 October, Johor, Malaysia. ***(Scopus indexed conference)***

Journal Papers:

1. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). Lean Construction: An Effective Approach for Project Management. ARPN Journal of Engineering and Applied Sciences. 11(3), 1607-1612 ***(Scopus indexed journal)***

2. D. O. Aikhuele, F. M. Turan, **Ansah, R. H**. (2016). Application of Intuitionistic Fuzzy Topsis Model for Troubleshooting an Offshore Patrol Boat Engine. International Journal of Maritime Engineering. Accepted ***(ISI)***

3. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). The 4Ps: A Framework for Evaluating Projects Delays. Journal of Engineering and Applied Sciences. Accepted ***(Scopus indexed journal)***

4. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). Towards an Integrated Manufactured Construction Processes: A Review. Buildings. Under Revision ***(ESCI - Web of Science & Scopus indexed journal)***

5. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). A Framework for Assessing the Effects of Lean Tools on Construction Project Delays. Arabian Journal for Science and Engineering. Under Review ***(ISI)***

6. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). Modeling the Impacts of Lean Tools on Construction Projects Delays. Arabian Journal for Science and Engineering. Under Review ***(ISI)***

7. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). Analyzing Risks in Construction Projects Development: The Case of Malaysia. American Journal of Engineering and Applied Sciences. Under Review ***(Scopus indexed journal)***

8. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). 4P Delays in Project Management. Engineering, Construction and Architectural Management, Emerald. Under Review ***(Scopus indexed journal)***

9. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2016). A Modified AHP-RPN Method for Project Risk-Based Assessment. Unpublished.

10. **Ansah, R. H.,** Sorooshian, S., & Shariman, B. M. (2015). Analytic Hierarchy Process Decision Making Algorithm. Global Journal of Pure and Applied Mathematics, 11(4), 2403-2410 ***(Scopus indexed journal)***

11. Oluyinka, O. S., Tamyez, P. F., Kie, C. J., & **Ansah, R. H.** (2015). Evaluating Supply Chain Strategy Decision Alternatives with Promethee Extended Through Allais Paradox. International Journal of Research, 2(3), 799-810.

Book Chapters:

1. **Ansah, R. H.** & Sorooshian, S. (2016). Sustainable Buildings for Developing Economies. Nova Science Publishers. Abstract Accepted

2. **Ansah, R. H.** & Sorooshian, S. (2016). Quality Management in Construction Projects. Nova Science Publishers. Abstract Accepted

Books:

1. **Ansah, R. H.** & Sorooshian, S. (2016). Lean Construction Tools and Techniques. (Working Paper)

Others:

1. **Ansah, R. H.**, & Sorooshian, S. (2016). Unethical Academic Operations: Deception in Disguise. International Journal of Ethics Education, **Springer**. 1-2 doi:10.1007/s40889-016-0029-4

2. **Ansah, R. H.**, Aikhuele, D. O. & Yao, L. (2016). Unethical Admissions: Academic Integrity in Question. Science and Engineering Ethics, Springer, 1-3, doi:10.1007/s11948-016-9815-9 Accepted ***(ISI (IF=1.45)***

3. **Ansah, R. H.**, & Sorooshian, S. (2016). Green Economy: Private Sector Led Initiatives to Climate Change. International Journal of Environmental and Science Education. Under Review (***Scopus indexed journal)***