



## Development of Rational Selection Model for Improvement Initiatives

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### ABSTRACT

The growth interest for adoption of improvement initiative indicate the important of improvement to improve extensive evolution of improvement initiative introduces throughout the decades compared to the initial introduction of improvement initiative. However, the existence of bundle of improvement initiative provide difficulties to organization to select most suitable improvement to be adopted. In addition, the failure deployment of improvement initiative in numerous organizations frequently reported with poor selection becomes one of source of failure. In the absence of explicit key decision criteria, decision maker highly depend on subjective judgements which biased to the experience and follow the fashion setting. This research aims to fill this gap by investigating the selection of improvement initiative to aid optimize decisions by bringing all influential criteria together in one model. This research incorporated two phases start with the development of conceptual model through comprehensive literature searching by adoption of systematic literature review (SLR) and continue with the semi-structured interview with the seven experts. The agreement among the experts was analyzed through Kendall Coefficient of Concordance which indicate strong agreement,  $w = 0.713$  for the selection model proposed earlier. The mean rank of each attribute contributes to the selection also provided as an importance factor to be considered while selecting the improvement initiative. Finally, the model introduced enable organization to select the improvement initiative in comprehensive and structured manner through consideration of wider selection attribute which is significant part of organization to carefully select improvement initiative to evade the problem of initiative overload to ensure successful implementation of improvement.

**Key words :** Improvement Initiative, Rational Selection, Decision Making.

### 1. INTRODUCTION

Two researchers [1] and [2] summarize several issues on the improvement activities by the organization in order to enhance their performance. The researcher found that, organization start to aware the important of IMI for sustainability of their business especially with increasing of market competitiveness.

However, in managing improvement activities, the main concern is on the management ideas of improvement whereby the numbers of IMI have significantly increased and the pace of development of IMI has advanced rapidly. Compared to the initial introduction of IMI, there are limited number of IMI available to be implemented in organization. However, as of today there are over 700 IMI available to choose by the organization start from the small improvement called as a tool, techniques until strategic improvement initiative such as improvement methodology and continuous improvement.

### 2. SELECTION ISSUE

The chosen of IMI is a critical since it will affect the effectiveness of improvement activity whereby the improvement can be very effective in the right hands and they can be dangerous in the wrong hand. It is very important to know how, when and which methods to be used in improvement activities [3],[4]. Even though there are over 19000 journals published [5] on IMI in two prominent index journal which are Web of Science ISI and Scopus as per Figure 1, lack of reference for the organization on providing assistance and guidance on how to select the suitable IMI to be adopted based on their requirement [6],[7]. Most literature

focusing on describing the concept, methodology and tools of each approach [1] whereby the literature often also providing empirical evidence on strengths, weaknesses and critical success factors [8],[9].

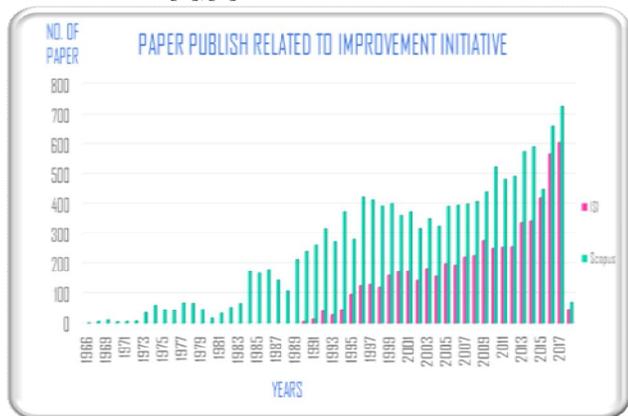


Figure 1: Trend Paper Published Related to IMI

The conventional selection of IMI relies heavily on the skill and experience of those who implementing it. Selections are rarely structured, and the selection criteria are inconsistent and may vary between managers; hence, the adoption of improvement initiatives is based on ambiguous judgments and is prone to follow fashion [1], [10]. In order to know the selection practice in Malaysia, the short survey involving well knowledge and experience expert with different background in IMI conducted to get some indicator on IMI selection. Based on answer given, the selection might be varied and align with statement given by [1],[7],[11] whereby the selection tendency based on the follow fashion or management fads and not structured. This effected the successfulness implementation of IMI whereby a lot of number of organizations adopted IMI over the time however, the failures of the implementation due to poor selection still happened.

The failure effected the motivation of organization to implement the IMI since the adoption of these programs consumes a large amount of time and resources as an example General Electric required over RM 53M for implement Six Sigma. Organizations normally face constraints in terms of budget, time, and personnel, and as improvement projects may also disrupt normal operations and standard routines. Thus, the effective and efficient selection and alignment of them with organizational objectives is critical for the success of any improvement initiative adopted.

### 3. RESEARCH METHODOLOGY

This research incorporates two main phases start with comprehensive literature searching through adoption of SLR and to provide a theoretical grounding of several information extracted focusing on definition of IMI, list of IMIs, selection criteria and selection method. The second phases focusing on

the development of the model through affinity diagram and verification of the rational selection model through semi structured interview with eight experts who involved in IMI more than 10 years.

#### 3.1 Phase 1: Systematic Literature Review (SLR)

SLR is a systematic way to develop comprehensive literature review for a researcher. Instead of using traditional way which is narrative, researcher has an option using SLR or Meta-analysis to develop the literature review or using both. The word “systematic” refers is an adjective the ways to construct literature review based on clearly formulated questions, identifies relevant studies, appraises their quality and summarizes the evidence by use of explicit methodology. Thus, by using the SLR, it can overcome the perceived weakness of a narrative review [12]. Moreover, an SLR provides a replicable research protocol [13] and the detailed documentation of the performed step within the SLR enables an in- depth evaluation of the conducted study [14]. Based on literature review summarize by [5], the number of researchers review the literature using systematic approach increase rapidly for the past 20 years.

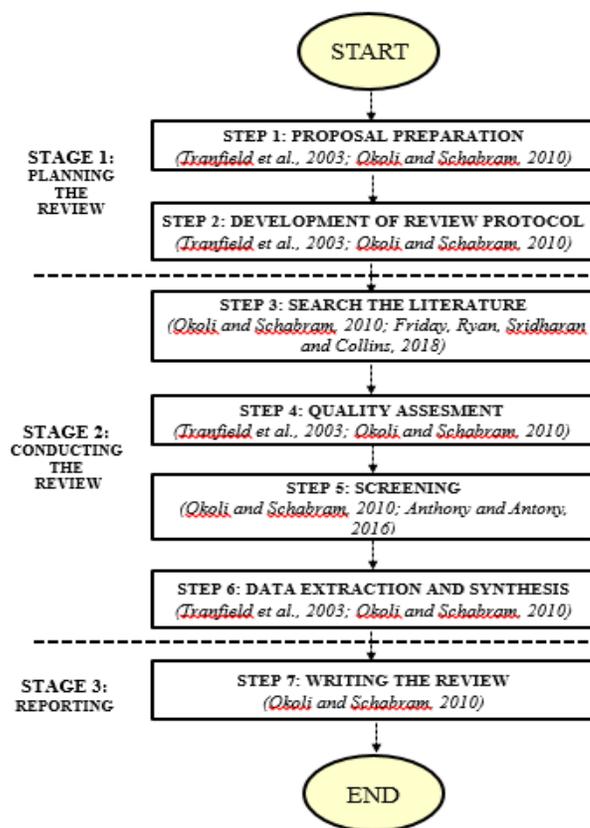


Figure 2: Summary SLR stages and step adopted

SLR required dedicated protocol which involve structured step to ensure the information extract in literature comprehensively drive and govern the information required by the researcher. However, there are lots of contradiction on number of stages and step adopted for SLR by different

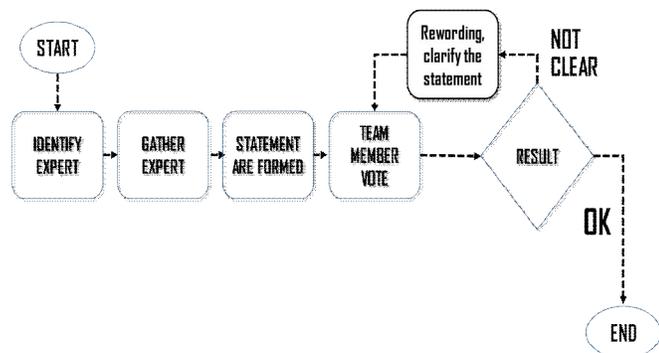
researcher [5],[12],[13],[14],[15]. This issue has been addressed by introduction key characteristics of a SLR defined by the Cochrane Collaboration [15]. Through screening the key characteristic of SLR, this research adopted three phases with seven steps for SLR which can be referred in Figure 2.

The information extracted through SLR used to develop the rational selection model for IMI which explain in phase 2.

**3.2 Phase 2: Development of Rational Selection Model**

Development of rational Selection model for IMI start with clustering and grouping the criteria selection using Affinity Diagram. This tool systematically helps to segregate all listed selection view and attribute into a proper group and finally a new header of that group can be established accordingly w which justify a structured manner of selection view and its item for IMI selection [16].

The finding from the formation of dedicated group for attribute of criteria selection further enhance by conducting the conducted with industrial practitioners using Expert Opinion Analysis, known as the Delphi Method, to verify, strengthen and enhance this research’s outcome [17]. The agreement between the expert on the formation and clustering the selection criteria attributes will be measured to ensure the validation of model propose. The step for conducting the consensus group technique can be referred in Figure 3.



**Figure 3:** Consensus Group Technique

**4. RESULT AND DISCUSSION**

**4.1 IMI Criteria Selection**

Based on the 18 papers reviewed, there are total 84 attributes and nine constructs mention in previous research. This information will be used to develop conceptual model for selection of improvement initiative. The more angle of selection provides greater option for decision maker identify suitable improvement initiative to be adopted in their organization.

**4.2 Development of Conceptual Model for IMI Selection**

Some of the construct and item are redundant and some of the item doesn’t belong to any of construct mention or stand

individually in the previous literature. The researcher has difficulty to rearrange the appropriate construct and items. One of effective technique to clustering the construct and attributes is affinity diagram which is one of seven new quality tools.

The first step is to review the duplication of the construct and attributes which similarly mention by the previous researcher. From the total nine constructs mention, two constructs refer to similar selection view which are pay off [2] or value/benefits [18] whereby the items for each construct indicated similarly. The item for feasibility mention by [18] also exists in construct mention by [19] which is internal factor. The next step is to review the duplication of item for each attribute. Out of 84 items mentioned, there are 38 items redundant in the previous research and the remaining item after remove duplication are 46 items. Table 1 show the remaining item and the source of reference of each item mention in previous research.

**Table 1:** Attribute for Selection Criteria and Source of Reference

<b>N O</b>	<b>ATTRIBUTE S</b>	<b>SOURC E</b>	<b>AUTHOR/RESEAR CH ER</b>
1	Capabilities	7	Antony and Banuelas (2002), Cagliano & Spina (2000), Mohammad et. al (2011), Thawesaengkulthai (2010), Pande et al. (2000), Voss’s (1995)
2	Strategic	5	Barad & Gien (2001), Banuelas et al. (2006), Kornfeld and Kara (2011), Pannick et al., (2016), Voss’s (1995)
3	Goals	4	Aqlan & Al-Fandi (2018), Cagliano & Spina (2000), Mohammad et al. (2011), Thawesaengkulthai (2010)
4	Company Direction	3	Abrahamson (1991) Abrahamson (1996), Thawesaengkulthai, (2010)
5	Fashion Setting	3	Mohammad et. al (2011), Thawesaengkulthai, (2010), Pande et al. (2000)
6	Improvement Needs	3	Barad & Gien (2001), Bendell (2005), Pande et al. (2000)
7	Organizational Impact	3	Antony and Banuelas (2002), Thawesaengkulthai &

			Tannock (2008), Thawesaengkulthai (2010)	<b>25</b>	Area of Implementation	1	Mohammad et. al (2011)
<b>8</b>	Achievement Possibility	2	Mohammad et. al (2011), Thawesaengkulthai, (2010)	<b>26</b>	Company Needs	1	Thawesaengkulthai (2010)
<b>9</b>	Availability Resources	2	Mohammad et. al (2011), Kornfeld and Kara (2011)	<b>27</b>	Compatible	1	Mohammad et. al (2011)
<b>10</b>	Best Practices	2	Thawesaengkulthai (2010) Voss's (1995)	<b>28</b>	Competitor Strategies	1	Cagliano & Spina (2000)
<b>11</b>	Business Benefit	2	Antony and Banuelas (2002), Bendell (2005)	<b>29</b>	Current Workload	1	Kornfeld and Kara (2013)
<b>12</b>	Company Performance	2	Thawesaengkulthai & Tannock (2008), Thawesaengkulthai (2010)	<b>30</b>	Customer Needs	1	Barad and Gien (2001)
<b>13</b>	Customer Satisfaction	2	Thawesaengkulthai & Tannock (2008), Thawesaengkulthai (2010)	<b>31</b>	Duration	1	Mohammad et. al (2011)
<b>14</b>	Expert Suggestion	2	Thawesaengkulthai (2010), Cagliano & Spina (2000)	<b>32</b>	Expectation	1	Thawesaengkulthai (2010)
<b>15</b>	Human Resources	2	Thawesaengkulthai & Tannock (2008), Thawesaengkulthai (2010)	<b>33</b>	External Factor	1	Mohammad et. al (2011)
<b>16</b>	Infrastructure	2	Mohammad et. al (2011), Thawesaengkulthai (2010)	<b>34</b>	Improvement Goals	1	Hayes and Wheelwright (1984)
<b>17</b>	Management Support	2	Aqlan & Al-Fandi (2018), Mohammad et. al (2011)	<b>35</b>	Internal Culture	1	Mohammad et. al (2011)
<b>18</b>	Market Performance	2	Thawesaengkulthai & Tannock (2008), Thawesaengkulthai (2010)	<b>36</b>	Knowledge resources	1	Thawesaengkulthai (2010)
<b>19</b>	Market Standard	2	Bendell (2005), Cagliano and Spina (2000)	<b>37</b>	Learning Practice	1	Cagliano & Spina (2000)
<b>20</b>	National Culture	2	Cagliano and Spina (2000), Thawesaengkulthai (2010)	<b>38</b>	Managerial Style	1	Cagliano & Spina (2000)
<b>21</b>	Past Experience	2	Cagliano & Spina (2000), Mohammad et. al (2011)	<b>39</b>	Nature of Problem	1	Aqlan & Al-Fandi (2018)
<b>22</b>	Process Improvement	2	Thawesaengkulthai & Tannock (2008), Thawesaengkulthai (2010)	<b>40</b>	New Trends	1	Thawesaengkulthai (2010)
<b>23</b>	Shareholder Benefits	2	Thawesaengkulthai & Tannock (2008), Thawesaengkulthai (2010)	<b>41</b>	Organisational Maturity	1	Mohammad et. al (2011)
<b>24</b>	Stakeholder Pressure	2	Cagliano & Spina (2000), Mohammad et. al (2011)	<b>42</b>	Organization Operation	1	Mohammad et. al (2011)
				<b>43</b>	Organizational Interest	1	(Bendell, 2005)
				<b>44</b>	Pay Off	1	Kornfeld and Kara (2011)
				<b>45</b>	Readiness	1	Thawesaengkulthai (2010)
				<b>46</b>	Weakness	1	Thawesaengkulthai (2010)
					Grand Total	84	

From the total remaining 46 items, 20 items don't belong to any construct or individually mention by previous research as an item to be considered when selecting the IMI. However, out of 20 items, there are seven items classified by other researcher under specific selection view which are availability resources [18], best practices [2], capabilities [18], company

direction [2] [18], management support [18], market standard [19] organizational impact [2] [20].

Five items remaining which are fashion setting [21], strategic [22] [23] [24] [25], external factor and compatible [18] and pay off [23] mention as one of selection view by [2] and [19] with the specific items. Throughout reviewing the context and detail information for each item mention by previous study, the researcher able to understand and classify remaining eight items to specific selection view for IMI selection which can be referred in Table 2.

**Table 2:** Classification of remaining item

ITEM	CLASSIFICATION	SELECTION VIEW
Business Benefit	The context of business benefits refers to the payoff (Thawesaengskulthai and Tannock 2008, Thawesaengskulthai 2010) receive through implementation of IMI.	Pay Off
Current Workload	Referring to internal capabilities which is part of internal factor discussed by (Cagliano & Spina, 2000) use for implementation of IMI	Internal Factor
Customer Needs	The context of customer needs refers to concern of customer as stakeholder (Thawesaengskulthai 2010) to ensure that the ability of IMI to enhance the capabilities of organization and align with their business requirement.	External factor
Goals	The context refers to the selection criteria of IMI to be aligned with the organization goal under the strategic fit (Thawesaengskulthai, 2010)	Strategic Fits
Improvement Needs	The context of improvement needs discusses by Pande et al. (2000) Barad and Gien (2001) Bendell (2005) refer to competitive priorities for the organization while select the IMI.	Competitive Priorities
Nature of Problem	The context of improvement needs discusses by Aqlan & Al-Fandi (2018) refer to competitive priorities for the organization while select the IMI.	Competitive Priorities
Organizational Interest	The context similarly discusses by (Thawesaengskulthai 2010 and Mohammad et al. 2011) whereby the	Strategic Fits

Past Experience	selection of IMI should be aligned with the organization direction. The context discusses by (Cagliano & Spina, 2000) refer to the selection of IMI based on historical data and experience by other organization which is one of the fashion setting (Abrahamson 1991, Abrahamson 1996)	Fashion Setting
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Through systematic and comprehensive review, the combination classification of selection view and item consist of seven selection view and 38 items which can be illustrate in Figure 4.



**Figure 4:** Classification of Selection View and Attributes

### 4.3 Consensus Group Technique (CGT)

Consensus Group Technique almost similar with the Focus Group Technique (FGT) but the key difference is the experts themselves drive and make decision on findings, instead of the moderator which is avoid the biased from the moderator normally the researcher who usually have tendency to get the result as per initial expectation. [26] highlighted the agreement level must reach 75% as an indicator that the statements reached the level of agreement based on voting conducted. However, this research adopts more accurate technique to measure the agreement level by using the statistical analysis. Kendall Coefficient of Concordance ( $w$ ) able to measure degree of agreement between the expert as a measurement indicator. Based on voting by 11 experts consisting of consultant, academician and practitioner, the value Kendall Coefficient of Concordance ( $w$ ) is 0.713 which indicate strong agreement between the experts as shown in Table 3. The experts agree that each attribute represent the selection view for IMI criteria selection.

**Table 3:** Result of Kendall's Coefficient of Concordance

#### Test Statistics

N	11
Kendall's $W^a$	.713
Chi-Square	290.194
df	37

The analysis using attribute agreement analysis also calculate mean ranking to represent the value of contributed attributes for each selection view as shown in Table 4. The higher mean rank indicates the higher attribute represent the constructs.

**Table 4:** Mean Ranks for Attributes

SELECTION VIEW	CODE	ATTRIBUTE / ITEMS	MEAN RANK	RANK
Competitive Priorities	CP2	Improvement Goals	29.86	1
	CP1	Duration	20.73	2
	CP3	Improvement Needs	11.68	3
	CP4	Nature of Problem	7.91	4
Influencer Setting	IS1	Best Practices	29.91	1
	IS3	Knowledge resources	24.23	2
	IS2	Expert Suggestion	18.45	3
	IS4	New Trends	10.55	4
	IS5	Past Experience	9.00	5
External Factor	EF3	Stakeholder Pressure	29.55	1
	EF1	Competitor Strategies	22.73	2

Internal Factor	EF2	Market Standard	21.77	3
	EF4	Customer needs	7.55	4
	IF5	Managerial Style	20.73	1
	IF3	Learning Practice	18.86	2
Organization Fit	IF1	Availability Resources	16.95	3
	IF4	Management Support	12.05	4
	IF2	Internal Culture	7.73	5
	OF3	Capabilities	29.91	1
	OF8	Readiness	29.09	2
	OF2	Area of Implementation	27.86	3
	OF5	National Culture	20.73	4
	OF4	Infrastructure	15.27	5
Pay Off	OF7	Organization Operation	11.73	6
	OF6	Organizational Maturity	11.09	7
	PO2	Customer Satisfaction	31.91	1
	PO1	Company Performance	30.86	2
	PO7	Shareholder Benefits	30.82	3
	PO5	Organizational Impact	27.27	4
	PO6	Process Improvement	11.73	5
Strategic Fit	PO3	Human Resources	10.55	6
	PO4	Market Performance	6.41	7
	SF1	Company Direction	29.91	1
	SF2	Company Needs	29.64	2
	SF4	Goals	29.45	3
	SF5	Weakness	15.45	4
	SF3	Expectation	10.55	5

### 5. CONCLUSION

As a conclusion, this research provides selection criteria model for IMI by providing holistic angle to be considered by the decision maker prior making decision. The rational selection model enable hospital to improve their performance through identify the correct improvement initiative to be adopted. The organization can save a lot of investment cost for adoption of IMI since they can make the decision without the existence of expert opinion. The appropriate selection of IMI also enables them to improve and optimize the operational process which provide a lot of saving on operational cost. a) The development of the final guidance model was mainly based on literature review, interviews and

evaluation survey with the small scale of respondent (11 experts). The researcher believe that the research can be generalized with high number of respondents as an example using quantitative method to generalize the model. The researcher also suggest that the IMI selection model proposed in this research can be expanded whereby instead of using manual selection, the intelligent decision support system can be develop as a mechanism to comprehend decision maker select the most appropriate IMI to be adopted and implemented which is more accurate on the result.

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