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Journal or Book? : The HydroGIS Perspective on Engineering and Computing Debate

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Abstract: There are numerous opinions and guidelines to select the most suited literature to state of art reviews. Even it brewed the most important articles align with the availed guidelines, some literatures may be providing controversial ideas. Whilst review the literatures' outcomes, the common practice is to assign equal weight to each literature. Eventually, these important controversial ideas conclude as a neutral concept in state-of-art scenario, whilst real is different. The initial discussion with the worldwide academics and professionals found that the novelty of the result and soundness of interpretation needs to be given weight rather than a source of publication. In the case of young students, such qualitative evaluation may direct error-prone conclusions due to less experience. Hence, to handle the controversial factors, novices require an accepted prioritization of sources with credible weights to each. Then, authors attempted to ask for the opinion of the academics from different streams and found there is a contradictory for prioritization. The academics from engineering discipline mostly trusted on books and guidelines whilst computing academics' trust won by index journals.

As the base work of the present work is a multidisciplinary research on HydroGIS framework development, it faced a problem when prioritise the literature sources.

By virtue of the identified possible sources of publications through the collected literature to the literature review for the work, rationale for each source was developed using the source credibility theory. The rational was evaluated with thirty-four academics & practitioners from different disciplines. Further it gathered their prioritization & weights for each source. Then findings were evaluated with another ten experts and discussed the outcome with three senior academics & practitioners for confirmation.

The present work found that the indexed journal is the most trusted source of information with a weight of 4.32 (out of 5) whilst web documents with least trust (1.49/5). Nevertheless, evaluation and confirmation discussions stressed to utilize a ratio of weights rather than numbered weights.

Key Words: Scientific weight of literature, Credibility Theory, HydroGIS, Journals or books?

Introduction

A. Background

Whilst the authors have been developing a HydroGIS tool development framework for urban flood management, it required to identify the factors to be considered in the framework through state of art review.

The majority of higher education institutes are guiding own students to creditable literatures for the academic activities as a common practise. Those guidelines

described different criteria as shown in the Table 1 and it highlights the "author" and "currency" of the literature are sine-quo-none. Then reviewing the availed guideline, it developed a comprehensive literature evaluating criteria as described in earlier work of the authors (Pradeep & Wijesekera, 2019).

Table 1: Evaluation criteria of a good literature

Criteria	The source			
	a	b	c	d
Author (reputation on field, affiliation)	x	x	x	x
Publisher (reputation, where, medium, format)	x		x	x
Accuracy (references, citation, peer review, error-free, relevance)	x	x		x
Currency (published date/ date matters?)	x	x	x	x
Coverage (audience, depth of info)	x	x		x
Point of View (bias? Info/ fact/ research outcome/ analysis ?)	x	x		x
Editions/ Revisions (update through time) and Title of the journal			x	

a: OntarioTech Library (2019) b: Run Run Shaw Library (2019)
c: Cornell University Library (2019) d: Berkeley Library (2019)

Following the developed criteria, it selected the best literatures, but the findings through the literatures were conflicting. Conflicting idea is a common phenomenon, but whilst review outcome, factor-nullifying was occurred. Nevertheless, whilst the confirming the factors with experts, again those nullified factors got prominence. Hence when re-view the literature review criteria, and found that the equal weighting of each literature is as a reason to erroneous.

Then the present work opened a web based discussion (see https://www.researchgate .net/post/How_to_weight_the_literature_in_ Literature_review?). With participation of senior academics from India, Poland and Malaysia, it found that there is no source weighting mechanism or guideline in practise. Further participants state the better option as the qualitative assessment of the individual articles following a published list of sources from trusted institutes like governments, universities, web of science, Scopus and so forth. The most senior scientist in the discussion, Roman Bohdan Hołyński (Poland), who is having more than fifty-year research experience, stated that, the novelty of the result and soundness of interpretation need to be given weight rather than source of publication. Even the discussion has given important inputs to the work, it terminated with no guidelines to priorities the literature sources, but added more attribute to the earlier literature evaluating criteria. It is fact that the substantial qualitative assessment needs more exposures and experience which could not expected from novice researcher.

B. Objective

Then, the objective of the present work is to develop a weighted list of sources to be utilised by novice researches.

Method and Materials

A. Identifying the Sources of Literatures

The term "sources of literatures" carries different meanings and utilizations in scholarly works. Specially when the scholars use the "Primary" and "Secondary" adjective to the noun "Source", conflicting categorisations could have been observed. For an example Saunders & et al (2009) describe a list of primary sources as report, thesis, conference proceeding & government publication whilst secondary sources as books, journals and government publications (Saunders et al., 2009). But this classification, questioning the Cronin et. al.,(2008) definition; the primary sources are any reports by the original researcher (But journal articles are most of the time through the original researchers and Saunders et al., categorised it in the secondary sources). Further secondly sources are describing some other's work but Saunders et al., categorise "report", which summarised others' work, to the primary source (Cronin et al., 2008). However, the both concepts are accurate to the concept and scenario that the

authors are developing. Not only these two but also in other literatures there are numerous categories, groupings, and classifications which leads the novices to more conflicts.

Therefore, the present work decided to limit to the sources of 32 literatures which utilised to state-of-art review and another 23 literatures which utilised in conceptual HydroGIS model building which are earlier works. Then, the present work identified eight sources such as (1) Specific Guideline/Standards (Accepted standard procedures between multi-nations/inter-institutions, legislations, bills, statements and Time-tested industry standards such as European Water Framework Directive (2000) and The Hague Ministerial Declaration (2000)), (2) Book / Book Chapter (Established and recommended books for the subject which published by the prominent authors such as "Applied Hydrology" of Chow, Maidment, & Mays (1988)), (3) Indexed Journal (Journals which are having an impact factor or index value calculated through standard databased like Web of Science, Scopus, and Google Scholar. Example is "IEEE Transactions on Dependable and Secure Computing" with 6.404 impact factor) (4) Peer Reviewed Journal (Journal which are subjected to review its articles using single/double/triple blind review process, but still those were not indexed in standard databases . Example is Elsevier's "Array"), (5) Conference Proceedings (The article published in indexed conferences and/or the such conference's proceedings are being referenced frequently by other prominent researches. Example is HydroGIS96 conference's proceedings which received more than 1000 citations to its articles.) (6) Thesis (The Doctoral, MPhil and research MSc dissertations of higher ranking universities. Example is "Neural-embedded discrete choice models" PhD thesis of Yafei Han, Massachusetts Institute of Technology), (7) Monograph (A single subject area focused research publications which written after standard critical evaluations by subject experts, but has not published in any of the sources described from 1-6 above. Example is "Urban stormwater hydrology" of D.F. Kibler (1982) at https://tamug-ir.tdl.org/handle/1969.3/24540) and (8) Web Document (news/interviews/ documents with update or review of the subject which the prominent researches are involved. Example is web documents regarding the usability by Jacob Neilson's, a leading researcher of usability).

B. Credibility of Sources

Once it identified the sources which important to study, then it needs to evaluate the credibility of each source. According to the actuarial sciences specialist, Longley-Cook (1950), credibility is a relative weight of one data over other data. This is also known as credibility theory. Present work utilised the concept of relative weight in line with credibility theory to develop a weighted list of literature sources. However, this weighted list need to be implied the belief of the scholars, academics and practitioners of the particular subject. Then, the "data" of credibility theory required to be "trust on source" and "weight of one data over other data" can be defined as "weighted average of trust on a source" as the credibility theory is based on weighted averages (Venter, 2003). For the purpose, the present work attempted to capture the relative trust on given set of sources directly from the experts. However, due to the definitions and experiences are different, the present work needs to provide a common thinking - a rational - to expert before express their idea on literature sources.

Table 2: Conceptual Framework for Rational Building

Source of Literature	Four types of Fogg and Tseng (1999) initial credibility for computing			
	Presumed credibility (logos and pathos) Establishment Level of the idea	Reputed credibility (logos and pathos) How the idea was evaluated	Surface credibility (ethos) Acceptance of publisher	Experienced credibility (logos and pathos) Probability of individual experience with the idea
Specific Guideline/ standards	Established idea	Panel Reviewed	Reputed publishers	May be or may not. But have seen the application of idea
Book / Chapter				Probably Very high
Indexed Journal	Novel idea			Probably very low
Peer Reviewed Journal				
Conference Proceedings	Arguable idea	A group of people discussed with different perspectives		
Thesis		A limited set of people discussed subjectively		
Monograph	Tested only by the presenter	Evaluation and Result of the literature itself		
Web Document	General view to Novel idea	Comments and recommendations by viewers	Varying reputation	

Then when develop a rational, the twentieth century thinking of Aristotle on rhetoric communication grasped the present work's attention due to listeners' trust perception on an idea is based on the source or the person who is presenting (Berlo, Lemert, & Mertz, 1969). Aristotle described three persuasion concerns; logos (the fact or logic of the expression), pathos (interpretation of the facts/the emotion) , and ethos (credibility / legitimacy of the source) (Bade, 2009). This concept has interpreted in different ways in different studies. However, in general view it can be categorised the "source of an article" in to two distinct ways, (1) the author and (2) the place where the literature published. But the present work concern is to weighting the second categorisation - the place where the literature published or the ethos. However, when consider the publisher's credibility based on the viewers' point of view, in can be interpret the remaining two (1) logos - General trust on the accuracy of the literatures published by a particular publisher(source) and (2) pathos -Trust on the process which the publisher follows to clarify the contents of literature.

The Aristotle's concept was reviewed by Braet (1992) and stated that when the statement (the outcome of the expression) is having on rational judgment and better procedure, the logos play major role in trust building. In other way the pathos and ethos play the major role to make believe the viewers on the fact even does not have a better rational and/or better procedure (Braet, 1992). Therefore, the present work developed a conceptual think which "when evaluate a weight the source of literature, it should consider not only ethos but also pathos and logos".

However, one of the established theory on credibility, the Source Credibility theory, has being developed based on the ethos (Berlo et al., 1969; Hovland & Weiss, 1951). Three dynamics are in source credibility theory. Fogg and Tseng (1999) articulate the "initial credibility", one of source credibility dynamics to the field of computing. They provide four types of credibility for computers (1) Presumed credibility: general trust-assumption in mind (b) Reputed credibility: how third-parties trust on source (c) Surface credibility: trust given by the

appearance of the source and (d) Experienced credibility: own experience with the source (Fogg & Tseng, 1999).

When critically evaluate these four types, the present work observed that those confirm the conceptual thinking of the present work, which is "when evaluate a weight the source of literature, it should consider not only ethos but also pathos and logos". Therefore, based on the Fogg and Tseng (1999) four types, it developed a conceptual framework for each source as shown in Table 2. Then based on the conceptual framework, it developed a rational as shown in the Table 3.

Table 3 Rational for different literature sources

Literature Source	Rational
Specific Guideline/ standards	Established reviewed documents for new technology considered as appropriate for practice
Book / Chapter	Established reviewed knowledge of seasoned knowledge and practice
Indexed Journal	Knowledge that had been thoroughly reviewed.
Peer Reviewed Journal	Knowledge that has been well reviewed
Conference Proceedings	Ideas for discussion of scientific forums which required critical review
Thesis	Similar work evaluated at institutional level and requiring further review
Monograph	Concept which require further review
Web Document	General views and ideas that may have value

C. Questionnaire Development and Data Collection

Once the rationales for each source were developed, it required to weight the sources parallel with the experts' trust. A three-questions were formed and 1st question was to capture the qualitative preference of the each rational for sources (used five-point Likert scale from Strongly Agree to Strongly Disagree). This question hopes to fix the readers perception with the source credibility attributes. Then 2nd question was to prioritise the sources (1-8 scale from 1 - highest priority to 8 - least priority). The question's expectation was to easily distinguish and prioritise the sources in line with the rational developed in the mind of participants. The third question was to weight the sources (10-1 scale, from 10 – highest weight to 1 – lowest weight). Once the participant comes to this question, his/her mind has a logical argument to give weights. The questionnaire was evaluated for the required purpose with 3 professionals in IT, GIS and Engineering filed.

Then online questionnaire was launched among 1300+ GIS professionals, 72 academics, 34 engineering professionals and 200+ IT professionals from local and foreign institutes and universities.

D. Data Analysis process

It received 34 successful and complete replies. After combing the data, the weights of the sources were calculated following the weighted average method which implies the normalised weights of the entire sample. The priority of the literature sources was calculated using simple average method. The acceptances of rationales were averaged assigning 1-5 scale value to qualitative scale (1 -Strongly disagree to 5 - strongly agree).

Then the same questionnaire was distributed with another ten experienced academics and practitioners who are senior professors and doctors for the evaluate the findings. The final outcome was discussed with three experts before make conclusions.

Analysis, Result and Discussion

A. Data Analysis and Result

The initial and evaluation participants' academic affiliations and experiences are shown in the Table 4.

Table 4: Summary of education and experience of the survey sample

Academic Quil.	Initial data collection		Evaluation		Total	
	No1	Avg2	No1	Avg2	No1	Avg2
BSc	9	4.00	-	-	9	4.00
MPhil /MSc	7	16.43	4	19.25	11	17.45
PhD	14	22.36	2	25.00	16	22.65
Professor	4	37.50	4	40.50	8	39.00
Total and average	34	18.5	10	28.90	44	20.52

1Number of Participants
2Average experience (Years)

The comparison of the averages of priorities, order of priorities and calculated weights of the sources between initial data collection and evaluation are shown in the Table 5.

Table 6 shows the final priority and weights which resulted after the evaluation of all 44 participants' opinions.

The comparison of rational acceptance for initial data collection and evaluation are shown in the Table 7.

Table 5: Breakdown summary of initial and evaluation data collection

Literature source	Initial data collection			Evaluation			
	A[1]	P[2]	W[3]	A[1]	P[2]	W[3]	PC[4]
Indexed Journal	2.4	1	4.27	2.0	1	4.50	5%
Peer Reviewed Journal	2.4	1	3.69	2.3	3 ↓	3.95	5%
Specific Guideline / standards	2.8	3	3.22	2.0	1 ↑	3.90	14 %
Book / Chapter	3.0	4	3.98	2.6	4	4.40	8%
Conference Proceedings	4.3	5	2.41	5.8	6 ↓	2.75	7%
Thesis	4.3	5	2.25	4.7	7 ↓	2.90	13 %
Monograph	4.9	7	2.39	5.4	5 ↑	2.95	11 %
Web Document	6.2	8	1.44	7.4	8	1.65	4%

[1]Average Priority score [2]Priority level [3]Weight (out of 5)
[4]Weight Percentage Change based on max weight (5)

Both, the initial and evaluation results for the averages for rational acceptances were received the "Agree" preference (Average value 4.0 in Table 7). This denotes the rational for the sources were accepted and confirmed by the experts. Further it demonstrates the applicability of Fogg and Tseng (1999) four types of initial source credibility theory and Aristotele's logos-pathos-ethos notion to formulate conceptual framework for rational building.

Table 6: Final literature source priorities and weights of the survey

	Priority		Final Average Weight (out of 5)
	Average	Order	
Indexed Journal	2.33	1	4.32
Peer Reviewed Journal	2.37	2	3.75
Specific Guide/ standards	2.57	3	3.38
Book / Chapter	2.91	4	4.08
Conference Proceedings	4.64	6	2.49
Thesis	4.42	5	2.40
Monograph	5.02	7	2.52
Web Document	6.47	8	1.49

Table 7. Acceptance of the rational for trust on literature sources

Literature source	Average Acceptance (1-5 scale) *	
	Initial data collection	Evaluation
Specific Guideline/ standards	4.0	4.3
Book / Chapter	3.9	4.2
Indexed Journal	4.3	3.8
Peer Reviewed Journal	4.4	4.3
Conference Proceedings	3.8	4.0
Thesis	3.6	3.7
Monograph	4.0	3.8
Web Document	3.8	3.7
Average	4.0	4.0

* 1- Strongly Disagree, 2- Disagree, 3- Neither, 4 – Agree, 5 – Strongly Agree

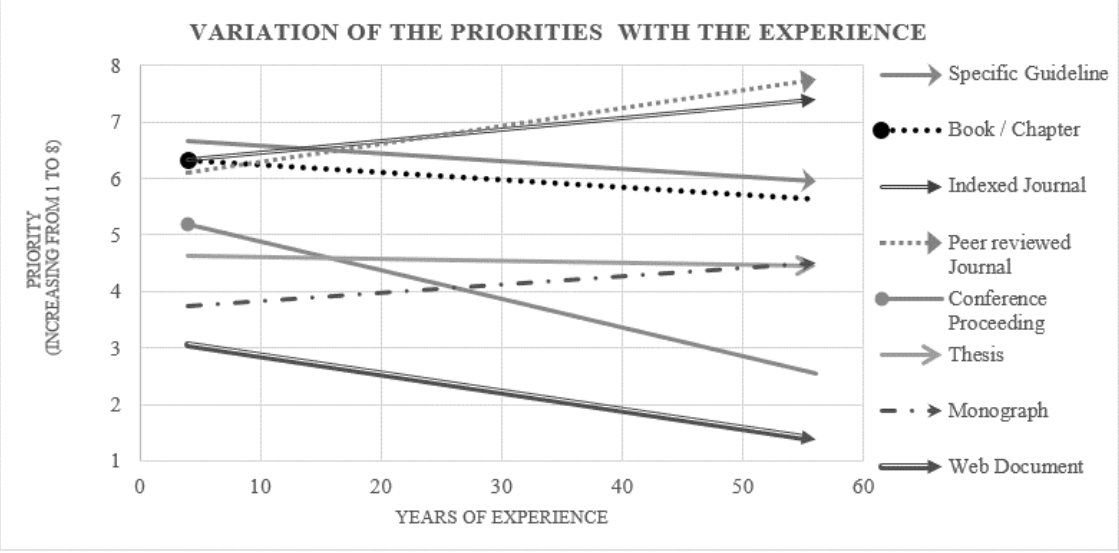

Figure 1: Influence of experience on the prioritization of literature sources

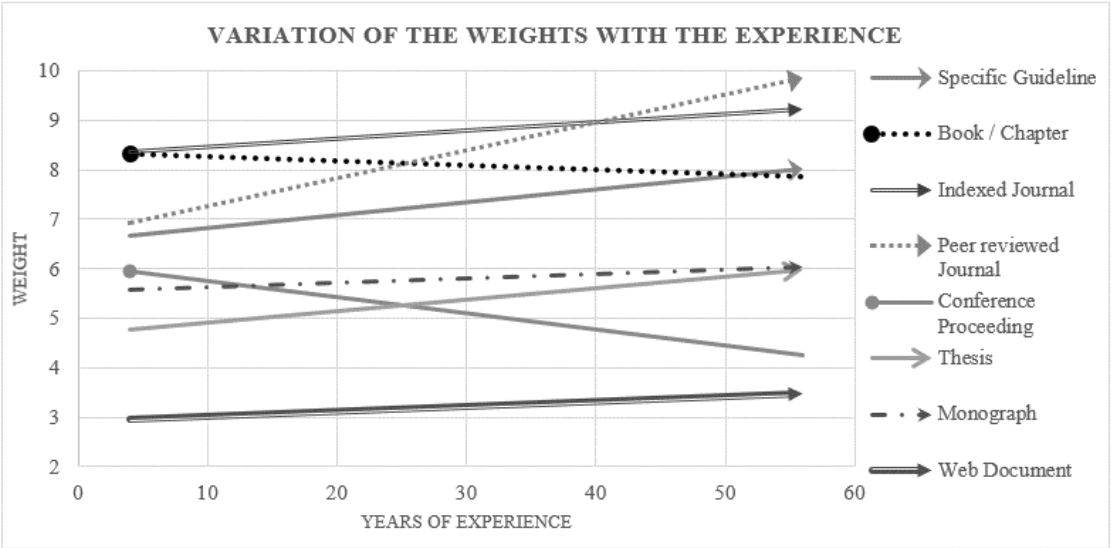

Figure 2: Influence of experience over the trust on literature sources

When prioritising the sources, the present work found that the indexed journal and peer reviewed journal receive the higher priority whilst web document gets the lowest. These two positions are confirmed at the evaluation, but other sources' priorities were not.

Then, it reviewed the data set and found that the "prioritization thinking" is having a relation with the relative experience of individuals (Figure 1).

Further, when compare and evaluate the given weights to each source, it observed a less prominent variations of the weights between initial and evaluation outcomes (See table 5). Even though the weights are number-wise increased with the evaluators' perception, the order of the weights has been not changed except conference proceeding. The evaluators weight the conference proceedings less than monograph. Then with understanding of prioritization relation with experience, it captured the same variation of the concern on the literature weight too (Figure 2).

Then there are two fundamental observations.

(1) With more exposure to the research and practises, the academics and practitioners are frequently looking at the indexed/peer reviewed journals whilst losing the attention to conference proceedings and web documents. However, the specific standards, thesis, books and monographs remain in the same important throughout the career.

(2) Under the same condition of 1st observation; the practitioners and academics started to believe the contents of the specific guidelines, thesis, and peer reviewed journals. Further it is elegant that the trust on index journal and web document are slightly increasing whilst collapsing of trust on conference proceeding even it got the priority. However, the books and monographs remain in their trustworthiness.

B. Expert discussion

These outcomes were subjected to discussion with three senior academics who are having more than forty years of academic and practical experience. Their explanations could be grouped in to three major concerns on literatures; the novelty of an idea, own experience with an idea and accuracy confirmation process of idea. The novelty of an idea will not depend the source where it published but the idea should be inspired a new way of thinking in the reader's mind. Then the attention goes web documents as those contains not only author's idea but also the readers' views in the comment sections. If idea given by the literature is time-tested practise or assisting such practise, again the reader gives more weight to such sources. The time tested monographs, subject specific standard books which recommended by the experts and standard & procedures practised for long time are receiving more attention whilst state-of-art reviews. The speciality of this type of literature is, those were referenced by many researchers since long time. The method of evaluation which is practised by the literature source implies the accuracy confirmation of the idea; with arguments on the process due to their own experience, the experts indicate that they mostly trust the indexed and peer reviewed journals as those are thoroughly evaluated by the subject specialist than the thesis and conference papers.

Then the views of the experts confirmed the weights and those sequence; (1) the higher weights (varying from 3.38 to 4.42) found for Indexed Journal, Peer Reviewed Journal, Specific Guideline / standards and Book / Chapter, (2) the average weights (2.40 to 2.52) found for Conference Proceedings, Thesis and Monograph and (3) the lowest weight (1.49) found for web document; through this study. Finally it could calculate the ratio based on the group averages as 39 : 25 : 15 between (1):(2):(3) above.

Who won the Engineering and Computing Debate on Journals or Books?

In nut shell the present research attempted to find a cross disciplinary accepted weights on different literature sources. However, it is important to share the discipline oriented findings. Therefore, it reviewed the collected data and selected the best 33 professionals from three disciplines (1) Engineering (with maths and medicine) (2) Computing and (3) Geography. Figure 3 shows the different disciplines' interests. Interestingly, the well-established research discipline like engineering and medicine equally trust on Books, guidelines and indexed journal papers relatively. The emerging computer discipline which is having dynamic findings frequently believe the peer review and indexed journals. However, the geography experts seek the knowledge with diversified attitude on monographs. It is worth to note that, these findings are only a guideline for further research as it required more extended sample size from each discipline to come to a conclusion.

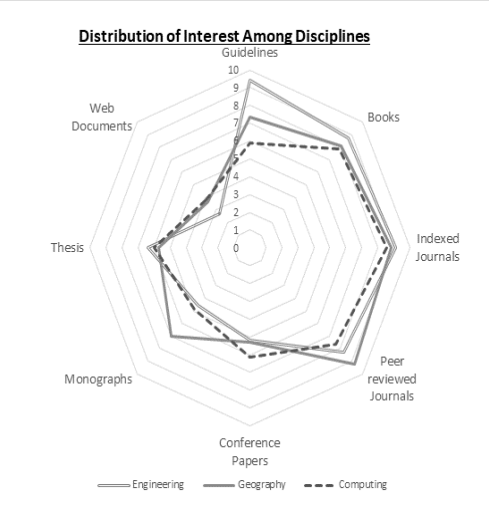

Figure 3: different Disciplines' Interest Distribution

Conclusion

The present work attempted to find weights for eight type of literature sources. By developing and confirming a rational for the trust on literature sources, it demonstrated the successful utilization of Initial Source Credibility Theory and Aristotle's ethos-pathos-logos concept for the work.

Present work found weighted numbers for the literature sources through the views of 44 experienced professionals and academics who are having 20 years' average experience. According to the finding the highest weight (4.32 out of 5) was received by the indexed journals whilst the lowest by web documents (1.49/5).

After the expert discussion, it found that calculating an exact weight for the sources is not justifiable. Nonetheless it concluded that more justifiable weight ratio among the literature sources as 39:25:15 which 39 for Indexed Journal, Peer Reviewed Journal, Specific Guideline / standards, Book / Chapter, 25 for Conference Proceedings, Thesis, Monograph and 15 to Web document.

The expert discussion inspired a different thinking on the classification of the literatures under three concerns which based on the idea expressed by the literature, i.e. Novelty, Experience and Accuracy. As no critical study has being carried out on these concerns, it needs the attention of the future researchers.

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