



Hard and Soft Sciences: How Both Fields Differ in Presenting Research Gaps

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Abstract: Studies on research gap presentation only focused on certain field of studies, whereas there are no studies that try to compare different field of studies. Therefore, this research aims to fill the gap and investigate how authors from different field of studies present research gap in their research articles. As the research gap presentation are mainly occurred in the beginning sections of an article, 100 article introductions from 10 journals have been analyzed. The journals were divided into two major fields which are Hard Science and Soft Science. Analysis was done to find out what types of research gap strategies that is used by the authors following the seven research gaps framework: evidence gap, knowledge gap, practical-knowledge gap, methodological gap, empirical gap, theoretical gap, and population gap. The results show that authors from both Hard Sciences and Soft Science used knowledge gap as the most frequently used strategy and theoretical gap as the least frequently used strategy. Other result is authors in Hard Sciences use more varied strategies than in Soft Science. Furthermore, both fields seem quite similar regarding the occurrence of research gaps while still has differences in some parts.

Keywords: Introduction Section; Research Articles; Research Gap

Introduction

Research gap usually be presented in the beginning sections of a research article as a way to attract readers' attention and keep them interested to read further. As Hyland (2013), Lim (2012), and Shehzad (2008), research gap is to promote an article as well as give conviction and expectation to the readers. Because of that reason, research gap will gain more impact if presented in abstract or introductions. While it will attract attention in abstract section and let readers to skip or read more (Amnuai, 2019), in introduction section it will be firmer to direct readers to research topic (Swales, 2004, 1990). Readers will be interested by novelty and new knowledge promised by the research gap presentation, therefore presenting research gap in the beginning section is very important.

The way to indicate a gap in research article is part of niche establishment that has been investigated several

times. Firstly, Swales (1990) provide a framework of possible moves in creating a research space (CARS) which is updated in Swales (2004). Further, more researchers followed to investigate niche establishment in different fields such as in biology (Samraj, 2002), biochemistry (Kanoksilapatham, 2005), psychology (Loi, 2010), agriculture (del Saz Rubio, 2011), and across diciplines (Swales, 2004). Their results show that indicating a gap is dominantly used a move in establishing a niche. This result led to further investigation in how authors indicate a gap in their research articles (Lim, 2012; Müller-Bloch & Kranz, 2015; Miles, 2017; Arianto et al. 2021; and Arsyad & Zainil, 2023). By the time, there are also research gap framework created by the researchers as Müller-Bloch & Kranz (2015) propose 6 research gap strategies, Miles (2017) propose 7 strategies, and Arianto et al. (2021) fount 5 strategies. In this research, research gap framework from Miles (2017) is believed to represent research gap

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strategy appropriately, thus Miles' model of research gap framework is used to analyze the corpus of the research.

Previously, several researchers have studied and investigated the occurrence of research gap strategy in research articles. All the the researchers focus only on one field, for example Lim (2012) in management, Suryani et al. (2015) in computer science, and several researchers in linguistics (Chen & Li, 2019; Arianto et al., 2021; Arsyad & Zainil, 2023). However, there is not any studies that investigate research gap used by authors from different fields. Comparison is important to see how authors from different field might be differ in presenting research gap. It also important to investigate whether knowledge field affects writing style or not. Therefore, this case become a rationale for this research.

In Indonesia, there are professional researchers, lecturers, and students who publish their articles in research journals. Supported by regulation from UU no. 12 year 2002 and Permenristekdikti no. 50 year 2018, they are now obliged to publish articles in national or international journals. While publication numbers keep increasing, there are also data reported by Lukman et al. (2016) showing different number of publications where certain fields has more publications than the others, especially natural science compared to social science. Authors from different field might have different writing style, or they might also correlation between culture and authors' writing style (Kanoksilapatham, 2007). There is also assumptions that Indonesian people consider critics and reviews to previous studies and findings are rather impolite, meanwhile reviewing and criticizing is the core of presenting research gaps. Therefore, it is important to investigate how Indonesian authors from different fields present research gaps in research articles.

This research investigated research gap used by authors using research gap framework by Miles (2017). Articles that are written by Indonesian authors were the focus of this investigation to see their writing style as it might be different to the writing style of western authors (Kanoksilapatham, 2007). Further, this research only investigated research gap in introduction section, though it can also be found in abstract (Arianto et al., 2021) and in literature review (Chen & Li, 2019). Introduction section will be more firm in presenting research and establishing a niche (Swales, 1990, 2004), whereas authors will have words limitation in abstract section (Arsyad et al., 2023). In addition, presenting research gap in the beginning section will give more impact to attract, persuade, and convince the readers (Samraj, 2002; Swales, 2004; and Amnuai, 2019), thus if presented in literature review section, it will give less impact. Research gap strategy in different field also never been studied in previous studies, thus in this

research we divide the field into two major fields which are Hard Science (natural) and Soft Science (social). Therefore, rationale of this research is investigating Indonesian authors' writing style in presenting research gap strategy at Hard Science and Soft Science research article introductions.

Method

This research was designed as qualitative research with content analysis method to analyze how authors from different fields differ in presenting research gap. The corpus was taken from 10 different journals that are published and managed by Indonesian scholars or academics. The journals is then divided by two major fields where 5 of them are from hard science, and the other 5 are from soft science. 10 articles were randomly taken from each journal and only focusing on Indonesian authors. The corpus of this research can be seen in the following Table 1.

Table 1. Corpus of the research

	Codes and Journals	Total Articles
Hard Sciences	(AMI) Acta Medica Indonesiana	50
	(HJB) HAYATI Journal of Biosciences	
	(AJA) AGRIVITA, Journal of Agricultural Science	
	(JET) Journal of Engineering and Technological Sciences	
	(ATI) Atom Indonesia	
Soft Sciences	(JIS) Jurnal Ilmu Sosial dan Ilmu Politik	50
	(CAP) Cakrawala Pendidikan	
	(IJI) Indonesian Journal of Islam and Muslim Societies	
	(GMI) Gajah Mada International Journal of Business	
	(OSC) Operations and Supply Chain Management	

The research investigation of research gap was focused in introduction section of the research articles. The research gaps will be presented in seven types of research gaps based on Miles (2017) which are 1) Evidence Gap, where previous findings controvert one another, 2) Knowledge Gap, where there are no desired findings on certain topic, 3) Practical-knowledge Gap, that highlight behavior or practice that deviate from previous research results, 4) Methodological Gap, the urgency to vary technique and methods, 5) Empirical Gap, the need to verify and evaluate propositions, 6) Theoretical Gap, where there is lack in the theory, and 7) Population Gap, where population is not represented adequately. Those seven research gaps are believed to represent types of research gaps presentation; thus it is chosen as the framework to be used in this research.



Figure 1. The Seven Research Gaps from Miles (2017)

Data was collected by analyzing the introduction section of the articles. Sentences that are considered as research gap presentation were highlighted and counted according to its type. The data collected are frequency of each strategy and each journal, as well as the comparison of Hard Science and Soft Science. Further, to ensure the validity of the data, there was a research collaborator who act as independent rater and analyzed some portions (20%) of the research corpus.

Cohen’s Kappa coefficient was implemented to evaluate the data validity and reliability. Firstly, an independent rater was trained and assigned to analyze the research gaps found in introduction sections as well as classifying them to one out of seven research gap strategy based on Miles (2017). Data from researcher and independent rater that were analyzed by using coefficient of Cohen’s Kappa which will result in the following classification: <0.49 as poor; 0.49 to 0.59 as fair; 0.60 to 0.74 as good; and >0.74 as excellent. Sometimes in achieving an agreement, researcher and independent rater did several discussions. The results of analyzing and comparing the data with Cohen’s Kappa coefficient is 0.82 which can be classified as excellent.

Result and Discussion

Results show that authors in both fields, Hard Science and Soft Science, prefer similar strategy while presenting research gap in their research article introduction. Authors prefer some strategies to the other ones. The frequency and percentage of research gaps occurrence are also similar though there are also some differences among the preferences. The result can be seen in Table 2.

Table 2. Frequency of Research Gap Usage

Strategy	Frequency and Percentage			
	Hard Science		Soft Science	
Evidence Gap	7	14%	5	10%
Knowledge Gap	17	34%	23	46%
Practical-Knowledge Gap	4	8%	1	2%
Methodological Gap	9	18%	2	4%
Empirical Gap	13	26%	17	34%
Theoretical Gap	0	-	2	4%
Population Gap	3	6%	4	8%
Total	53	-	54	-

As can be seen at Table 2, Knowledge Gap is the most frequently used research gap strategy where in Hard Science it is found in 17 articles and in Soft Science it is found 23 articles. Empirical Gap is also frequently used in both fields with 13 articles in Hard Science articles and 17 times in Soft Science articles. Some strategies were rarely used and only found in less than 5% out of the total articles. Theoretical Gap is rarely used in both fields that even there is no appearance of it in Hard Science while only found 2 times in Soft Science. Further, in Soft Science, besides Theoretical Gap, Practical-knowledge Gap and Methodological Gap are also rarely being used.

Knowledge Gap and Empirical Gap mainly focus on the insufficient research of certain topics or a lack and limitation in previous research. This finding is similar to Müller-Bloch & Kranz (2015) who found that knowledge void is the most dominantly used strategy while Arianto et al. (2021) and Arsyad & Zainil (2023) found that stating insufficient research/findings is the dominant strategy used by the authors. According to Arianto et al. (2021) the strategy is chosen because the authors want to fill the gap found in previous studies. Similarly, Robinson et al. (2011) also claim that stating insufficient research can be used when there are gaps in previous studies that it will give less contribution for recent knowledge.

From further result and analysis, it is found that Knowledge Gap and Empirical Gap do not need much review on previous research. The authors only present what the recent known findings are, then state what has not been known. This writing style may represent Indonesian authors where they have culture that hold them to criticize and review other people’s work (Kanoksilapatham, 2007). Both Hard and Soft Science authors seems to have different style in presenting these type of research gaps. Adnan (2014) adds that Indonesian authors tend to respect others which prevent them to give critics and negative evaluations to previous studies.

The following extracts are the examples of Knowledge Gap and Empirical Gap presentation by authors in the introduction section:

Extract 1 (Knowledge Gap)

... **Despite** these advances in understanding, the exact relationship between plasma concentrations of adiponectin and CAD **remains unclear** in clinical practice. (AMI.07)

Extract 2 (Empirical Gap)

... Hiquebran (2010), Cormet et al. (2016), Dondo and Cerda (2007) **did not consider** it. Therefore, besides applying the cluster first- route second concept, **this paper deals with** determining vehicle routes by applying the ... (OSC.05)

Extract 1 was taken from article written by Diah et al. (2019) entitled "Plasma Concentrations of Adiponectin in Patients with Coronary Artery Disease and Coronary Slow Flow" which is published in Acta Medica Indonesiana 51(4), while Extract 2 was taken from article written by Saragih et al. (2022) entitled "Location-inventory-routing Problem in a Context of City Logistics: A Case Study of Jakarta" and published in Operations and Supply Chain Management: An International Journal 15(2). From both examples, it can be seen that authors may state insufficient research or limitation in previous findings by giving less to no critics and reviews.

In contrast, Theoretical Gap need to review and criticize the lack of current theory, where Practical-knowledge Gap need to review and professional behaviors that contradict the current research findings (Miles, 2017). This style of writing seems not appropriate to Indonesian authors' style because they might find it rather impolite to review and criticize other people works (Kanoksilapatham, 2007). Further, Arianto et al. (2001) state that it might be due to the authors lack of experience and feeling small which then make them not confident to write that way. This also might confirm the assumption that there are correlations between Indonesian authors' writing style and their local culture (Kanoksilapatham, 2009; Adnan, 2009, 2014). In line, Tovar-Viera (2018) and Arsyad & Zainil (2023) said that English is unavoidable in writing an International Journal, though every author from various country will have their own culture that can be carried away while writing an article.

The following Extracts are the examples of Theoretical Gap and Practical-knowledge Gap presentation by authors in the introduction section of their research articles:

Extract 3 (Theoretical Gap)

.. Therefore, event marketing **needs to be redefined** as a marketing communication strategy that utilizes a social engagement orientation to create communication during interactions. Additionally, **reframing event marketing studies is critical**, ... (GMI.01)

Extract 4 (Practical-knowledge Gap)

... Some studies have offered professional teacher development consistently, **but** there are still **teachers who have not maximally carried out** the learning activities with good performance in madrasahs. Whereas the government's efforts to improve ... (CP.06)

Extract 3 was taken from article written by Setiawan et al (2022) entitled "Defining event marketing as engagement-driven marketing communication" which is published in Gadjah Mada International Journal of Business 24(2). In Extract 3, author need to firstly review the previous work, including highlighting the lack of the existing framework that need to be reframing. Extract 4 was taken from an article written by Tambak & Sukenti (2020) entitled "Strengthening Islamic Behavior and Islamic Psychosocialin Developing Professional Madrasah Teachers" published in Cakrawala Pendidikan 39(1). In this extract, authors review the condition of professionals that have not carried out learning process maximally, though the government have facilitated them with courses and certifications.

Both Extract 3 and Extract 4 need review and/or critics in presenting the research gaps. This case might not appropriate to other authors writing style as the culture hold them to make evaluative comment to others' work. In addition, both Hard Science and Soft Science authors seems similar to not using Theoretical Gap and Practical-knowledge Gap as can be seen from the low percentage of the usage. The possible reason for this case is again that review and critics is often considered impolite in Indonesian culture, eventhough review and critics is veri important to highlight what lack in previous work and what can be done in recent work (Sheldon, 2011).

Data can also be distributed to show how many articles from each field that present or do not present any research gaps in their introduction section. The data shows that most authors from Hard Science and Soft Science present research gap strategies in their article introduction, while some of them (26%) do not present research gap as can be seen in Figure 2.

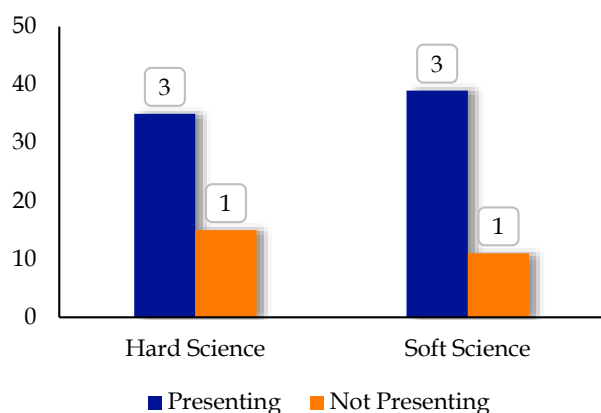


Figure 2. Articles that Present Research Gaps

As presented in Figure 2, the number of articles that present Research Gap is still similar. It might confirm that authors from both fields share the same writing style. However, it can not be ensured without further investigations. What can be inferred from the data is that there are authors that not present research gap in their articles, which are 15 authors in Hard Science and 11 authors in Soft Science. This finding can lead to two conclusions whether Miles’ research gap framework failed to acquire data, or the 26 authors prefer other way to present novelty instead of using research gap strategies. In this case, we might find more data if the corpus was analyzed using different framework model such as the one used by Lim (2012), Arianto et al. (2021), and Arsyad & Zainil (2023), or using the bigger model of creating research space from Swales (1990, 2004).

Result that can be highlighted from this research is the research gap strategy preferences by the authors. If it is divided into two major fields, hard and soft science, then Hard Science authors use more varied research gap strategy than Soft Science authors as can be seen from the result in Table 2. Then, by looking deeper, if we ignore the strategy that is used less than 5%, we can see that in Hard Science there will be 6 strategy preferences while in Soft Science only 4 strategies.

Table 3. Strategy Preferences

Hard Science	Soft Science
Knowledge Gap	Knowledge Gap
Empirical Gap	Empirical Gap
Methological Gap	Evidence Gap
Evidence Gap	Population Gap
Practical-knowledge Gap	
Population Gap	

As can be seen from Table 3, those strategies from each field is sorted by the most frequently used strategy to the less used ones, also ignoring strategies that is used less than 5%. However, those preferences might not be

valid because it need further investigation. Expanding the corpus might be done in the future investigaion to confirm this preference of how authors from Hard Science and Soft Science present research gap in their research articles.

Conclusion

Writing style might differs regarding the authors culture and background research fields. However, it is found in this research that authors from Hard Science and Soft Science may not significantly different to each other regarding the way they present research gap. Both of the fields prefer to use knowledge gap and empirical gap which are the most frequently used strategies with less review. Meanwhile, the least frequently used strategies are theoretical gap and practical-knowledge gap which seems to need more critics and review to be presented. Hard Science authors seems to use more varied strategies that Soft Science authors. In this case, ignoring the strategy with less than 5% occurrence, it is found that there are 6 research gap strategies that are preferred by the Hard Science authors, while there are only 4 research gap strategies that are preferred by the Soft Science authors. However, this preference might not be valid and it is important to be further investigated. This research also got some limitations to be considered such as corpus of the research which is only 100 articles from 10 journals that might not enough to represent both Hard Science and Soft Science. Next, this research only focused on Indonesian authors, while it might also important to compare them to international authors. It also important to investigate further about the correlation of culture and writing style because this research do not explore it deep enough. Hopefully, more investigations about research gap strategies and niche establishment can be occurred in order to provide more information that will contribute in the knowledge about academic writing.

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Author Contributions

Hidayat contributes in conceptualizing the research, developing the methods, analyzing data, and writing the paper. Safnil and Arono also help and contribute in conceptualizing as well as supervising the research process.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper

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