IRJEMS International Research Journal of Economics and Management Studies
Published by Eternal Scientific Publications
ISSN: 2583 – 5238 / Volume 2 Issue 1 January 2023 / Pg. No: 50-53
Paper Id: IRJEMS- V2I1P107, Doi: 10. 56472/25835238/IRJEMS-V2I1P107

Original Article

Improving IMRaD for writing research articles in social, and health sciences

[1]Prem Kumar
[1]Assistant Professor, Department of Management, Garden City University, India

Received Date: 31 December 2022 Revised Date: 11 January 2023 Accepted Date: 21 January 2023

Abstract: *IMRaD has evolved as a universal style of writing articles across the disciplines of social, and health sciences. From the early stage of merely reporting, writing letters, and description, IMRaD argued for mentioning introduction, methods, results, and discussion while structuring an article. The study aims to highlight the importance of a few other sections of an article. These sections (Title, Abstract) also play significant roles while searching, filtering, and using articles from any databases (such as Scopus, Web of Science, Pubmed). Structuring the title of an article, abstract, and literature review has become art for getting the articles accepted and published. The study emphasizes those areas to improve the IMRaD model using secondary data. Findings: It presents a logical argument on how to write each section of an article and its chronological order while developing an article from beginning. The article offers an improved model for writing research articles for all disciplines of research. It will assist the authors, publishers, and readers in understanding a research article in a better way.*

Keywords*: Article design, Article structure, IMRaD, Research article.*

I. INTRODUCTION

Research writing and publishing have always been a critical part of the academic career through which academicians disseminate the evidence-based research output and add to the body of existing knowledge (Oriokot et al. 2011). The humanities, arts, and science researchers need to present the entire research work in an organized fashion. A poor presentation or missing out on the important steps of research may lead to the desk rejection of an article (Dwivedi et al., 2022).

The research journey must be well-depicted to be accepted for publication. Going back in history, since 1665, scientific paper writing has evolved (Sollaci, & Pereira, 2004). Ever since then, there has been increasing awareness of developing the standard structure of an article in social, physical, and health sciences (Oriokot et al. 2011). The form and style of informing a research output were limited to the letter and experimental reporting in chronological order was later, added as a method section during the nineteenth century (Sollaci, & Pereira, 2004). It was reported that the IMRaD (introduction, methods, results, and discussion) model of writing research papers gained momentum during the twentieth century (Huth, 1987; Day, 1989).

Sollaci and Pereira (2004) found that there were no articles based on IMRaD till 1935. It was being used for reporting the research output in the 1940s and by the 1980s it was already an established scientific method of reporting the research output (Sollaci, & Pereira, 2004; Day, 1989). In recent times also, IMRaD has been increasingly used by arts, social, physical, and health science researchers as a standard research writing format (Oriokot et al. 2011).

The well-designed research article offers modular reading through a set of sections meant for specific information (Sollaci, & Pereira, 2004). It helps researchers in the organized presentation of evidenced-based facts and output and allows readers to look for specified information instantly. Although, IMRaD is accepted by authors, readers, and editors (Huth, 1987, Oriokot et al. 2011), the constant development and changes in research call for improvement in this model. In this context, the article focuses on improving the IMRaD by addition of important steps and its explanation in a logical way.

II. MATERIALS AND METHODS

The overall structure of an article can be designed under headings: Title, Abstract & Keywords, Introduction, Literature review, Data analysis, Results, Discussion, Conclusion, Acknowledgements, and References. For better understanding, these headings have been presented one by one in this article.

A. Writing a Title

The title of an article should give a clear meaning of what has been done in the research work. It may reflect the subject, process, context of the research, subject area, place, type of study, and outcome of the study (Bavdekar, 2016). The process may highlight an intervention, observation, survey, interview, analysis types, and tools used for analysis. These reflections

apply to articles of both social sciences and physical sciences. Researchers should try to keep the title length limited to 10-12 words (Shaban, & Macdonald, 2007), hence the selection of above -mentioned reflections should be done wisely. We shall avoid using any jargon, numerical values, and abbreviations until it is well known to everyone in that field of study (such as PRISMA, TAM, and ICT) (Bavdekar, 2016).

B. Writing an Abstract

An abstract should explain the suitability, sustainability, and implacability of the given research. It should highlight the research gap, area of research, methods used, analysis, tools, key results, and managerial implications in brief. Koopman (1997) suggests that a good abstract should focus on motivation (the reason to take up the research work), problem statement, approach (how do we propose to solve the problem, variables), results (a significant one), and conclusion (implications, generalizable or specific). One should also follow the specific word count asked by the journal (Koopman, 1997). It may be structured (Introduction, Aims or objectives, Methods, Findings, and Conclusion, summary, or discussion) or unstructured (Shaban, & Macdonald, 2007).

C. Writing the Introduction

Introduction creates a platform for the study. The authors need to highlight the novelty and the significance of the study (Dwivedi et al., 2022). It discusses the early work, presents the known and the unknown facts, highlights the research gap, states the problems, proposes hypotheses and clear objectives of the research work (Booth, 1975). It will also focus on available solutions and their limitations (Armağan, 2013). Authors should be able to justify how their study is different and what addition it will make to the existing body of knowledge.

D. Writing Literature review

This is a rhetorical section where writer uses expanded vocablury to illustrate the cited research papers for its maximal effect (Lingard, 2018). Theoretical insights, models, and their significance are required ingredients of this section (Wee, & Banister, 2016). It should clearly establish the theoretical background, identify the gaps, and define the key concepts related to the focus area (Nakano, & Muniz Jr, 2018; Rewhorn, 2018). Authors should discuss the constructs, factors, and variables to be used for research. The quality, source and reliability of the resources should be verified before writing the literature review (Lingard, 2018). Each resource should be critically discussed focusing the research and not just a summary of the resources.

Operational definition and conceptual model can also be presented in this section. It also presents the proposed hypotheses based on the research background and conceptual model development. It may have the discussion of independent factors and dependent factors to be used for the study. The reviews may be arranged in chronological order while writing for a Ph.D. thesis, but in research article authors should focus on factor-wise discussion of reviews. It will help in presenting the individual hypotheses. Systematic literature review (SLR) method can also be adopted along with inclusion and exclusion criterion.

E. Writing the Methods

The methods section should discuss the study design, data, sampling, measurement tools, analysis, and statistical tools to be used for the study. In physical, and health sciences, authors may need to present ethical approvals and permissions while writing the articles. Authors should avoid the trade names for the methods used in physical sciences and health sciences research (Booth, 1975). The most important methods should be discussed first followed by the least important. The chronology of the methods should follow the presentation of results as well.

F. Presenting the key Results

The result section is important as the authors present the analyzed data and it is limited to reporting the results. Results can be presented with taking help of units, quantities, tables, graphs, and charts (Booth, 1975). Important values (prescribed values, highest and lowest percentage, frequencies) should be informed. Table properties and values can be described clearly. Authors are advised that they should not start any form of discussion on results in this section.

G. Writing the Discussion & Conclusion

Although discussion comes at the end of the paper, it plays a vital role in describing the evidenced-based output and how the results are applicable, different, and unique from early research. This is the section of an article where the authors have the greatest freedom where brief logical arguments can be given in the discussion section (Booth, 1975). Rather than making it a summary, authors should highlight the significance, compare the new findings, and explain how it adds to the existing body of knowledge (Booth, 1975; Hess, 2004). The questions raised in the introduction section can be logically answered in the discussion. Limitations and suggestions for future research should be mentioned in this section. Hess (2004) suggests that there are important elements to be included in a discussion such as:

1. State the study's major findings
2. Explain the meaning and importance of the findings
3. Relate the findings to those of similar studies
4. Consider alternative explanations of the findings
5. State the clinical relevance of the findings
6. Acknowledge the study's limitations
7. Make suggestions for further research

Authors should avoid the over presentation or repletion of the results and should not speculate which is not supported by the research findings. This section should contrast the findings with early research and refrain from merely criticizing the other studies (Hess, 2004).

While writing a conclusion, authors should establish its connection with discussion, and introduction (Booth, 1975). This section is meant to present the summary of the results and discussion. It can include most general claims, beneficiaries of the study, implications of the findings, and recommendations.

H. Acknowledgments & References

Authors should offer due credit to the persons involved in the research process, to the funding agencies and institutes, advisors, and financial supporters. It can be extended to the proofreaders and typists as well. References (and citations) should be given as per the journal requirements. Usually, it is presented in alphabetical order or numerical order as used in citations.

I. Critical discussion

The IMRaD model does not imply numerical data, quantitative methods, experimental designs, and fieldwork but it is equally applicable for writing research articles in arts, humanities, and other fields of sciences (Codina, 2021). Research title, abstract & keywords, literature review/study area, conclusion, and references have been also given more importance in recent times. There have been more focused deliberations on each of these steps (Huth, 1987; Koopman, 1997; Hess, 2004; Armağan, 2013; Bavdekar, 2016; Dwivedi et al., 2022). The addition of these steps makes it a robust model for writing a research article in any field of research.

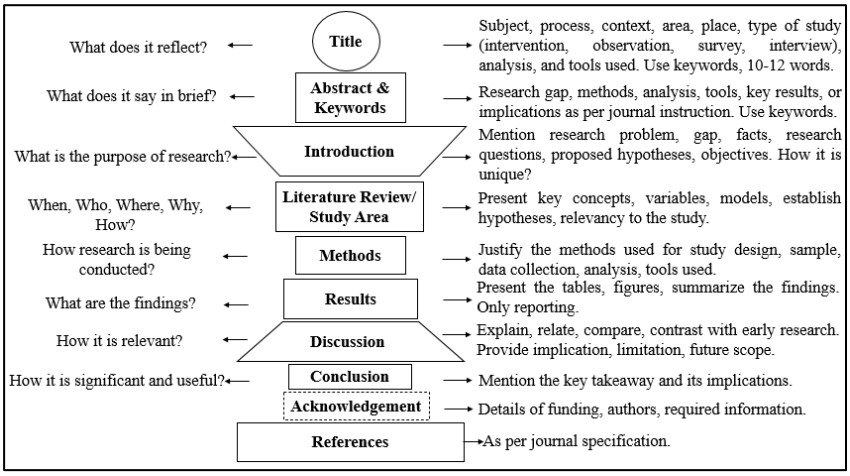

Fig 1.1: TAILMRDCR structure

Source: Adaptation from Wu (2011)

Authors may include an acknowledgment section if suggested by journals or if they wish to inform about funding agencies, the particular role of the authors, and any help from institutions or organizations.

Having witnessed all the above-mentioned steps in an article, one question may arise and that is the chronology of writing it. To which section an author should write first and how shall it proceed further? Based upon the importance of writing different sections of a research article, authors can follow the below steps to write a research article:

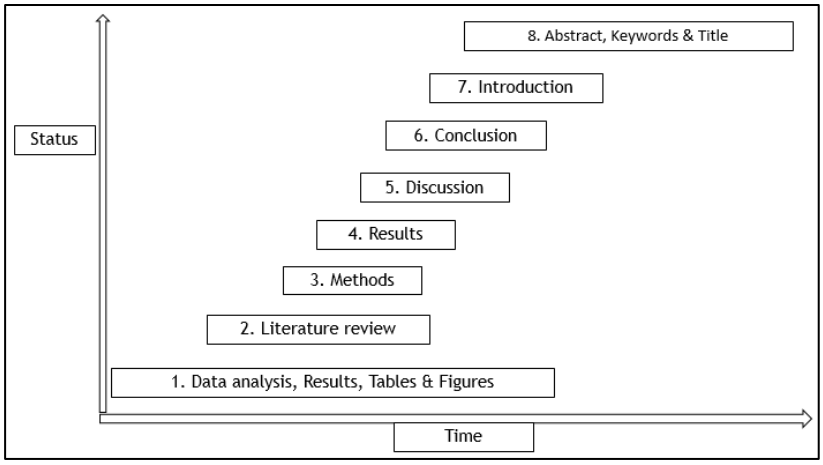

Fig 1.2: Article Writing process

Source: Author

Fig 1.2 depicts the status and timeline of writing an research article once the researcher has collected the data and information required for the article. The article wrting process should start form the data analysis and end at abstract writing. Abstract, keywords, and title are considered as a promotional tool for any research paper, hence it should be well crafted at the end of this process.

III. CONCLUSION

IMRaD has become one of the core models for writing articles in the scientific community. Although it does not follow the order of research but helps in better understanding. As Wu (2011) argues that IMRaD is an evolutionary process, hence, authors should also focus on the title, abstract, keywords, literature review, and references while writing the research articles. Further, it may be enhanced as "**TAILMRDCR**" (Title, Abstract & Keywords, Introduction, Literature review/Study area, Methods, Results, Discussions, Conclusion, References). In the recent times the importance of title, abstract have got attention of the authors, reviewers, and publisher for selection, review, and publication of manuscripts. Following each step while writing the research paper, authors can enhance their presentation skills. The given model will also benefit the peer review process as it gives a detailed perspective of the organized information. It will help authors, reviewers, publishers, and readers in having better dissemination of research information.

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