RENEWING SOCIOLOGICAL ANALYSIS TOOLS IN THE AGE OF ARTIFICIAL INTELLIGENCE: A CRITICAL ASSESSMENT OF THE EXPERIENCES WITH MONKEYLEARN, NVIVO AI, AND ATLAS. TI

Fairouz Latreche⁎

Abstract. This study aims to evaluate the effectiveness of artificial intelligence applications in renewing sociological analysis tools among postgraduate students, particularly those who are delayed in completing their scientific research. The study focuses on three primary applications: MonkeyLearn, NVivo AI, and Atlas. The descriptive-analytical approach was adopted, and the interview form was used as the principal tool, targeting a purposive sample of postgraduate students (Doctorate of Science and LMD Doctorate). The findings of this study indicate that these tools have significantly contributed to expediting the analysis process and reducing the required effort and time. Moreover, they have proven effective in the precise and advanced development and completion of scientific research, with notable quality in sociological analysis and in reducing delays in completion. The study recommends providing the necessary training and technical support. The emergence of artificial intelligence as a powerful tool in the digital age represents one of the novel approaches that has introduced a qualitative shift in scientific research, particularly from a sociological perspective. This transformation is achieved through the integration and renewal of applications beyond ChatGPT, thereby facilitating faster and more accurate analysis. In addition, these tools are capable of processing both quantitative and qualitative data in ways that rival the human intellect, presenting a new digital leap manifested in objective analysis.

Keywords: artificial intelligence, sociological analysis, MonkeyLearn application, NVivo AI application, atlas ti application

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ОБНОВЛЕНИЕ ИНСТРУМЕНТОВ СОЦИОЛОГИЧЕСКОГО АНАЛИЗА В ЭПОХУ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА: КРИТИЧЕСКАЯ ОЦЕНКА ОПЫТА ИСПОЛЬЗОВАНИЯ MONKEYLEARN, NVIVO AI И ATLAS.TI

Файруз Латреш⁎

Абстракт. Данное исследование направлено на оценку эффективности применения искусственного интеллекта в обновлении инструментов социологического анализа среди студентов магистратуры и аспирантуры, особенно тех, кто сталкивается с задержками при завершении своих научных исследований. В центре внимания находятся три основные приложения: MonkeyLearn, NVivo AI и Atlas.ti. Применён описательно-аналитический подход, а в качестве основного метода сбора данных использовалась форма интервью с целевой выборкой студентов (научная степень доктора наук и докторантура по системе LMD). Результаты исследования показывают, что эти инструменты значительно ускорили процесс анализа и сократили требуемые усилия и время. Более того, они доказали свою эффективность в точной и углублённой разработке и завершении научных исследований, повысив качество социологического анализа и сократив задержки. В исследовании рекомендуется обеспечить необходимую подготовку и техническую поддержку для эффективного использования этих инструментов. Появление искусственного интеллекта как мощного инструмента в цифровую эпоху представляет собой одно из новаторских направлений, внесших качественные изменения в научные исследования, особенно в социологической перспективе. Эта трансформация реализуется через интеграцию и обновление приложений за пределами ChatGPT, что способствует более быстрому и точному анализу. Кроме того, указанные инструменты способны обрабатывать как количественные, так и качественные данные на уровне, сопоставимом с человеческим интеллектом, представляя собой новый цифровой скачок, проявляющийся в объективном анализе.

Ключевые слова: искусственный интеллект, социологический анализ, приложение MonkeyLearn, приложение NVivo AI, приложение Atlas.ti

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SÜNİ İNTELLEKT DÖVRÜNDƏ SOSİOLOJİ TƏHLİL ALƏTLƏRİNİN YENİLƏNMƏSİ: MONKEYLEARN, NVIVO AI VƏ ATLAS.TI İLƏ TƏCRÜBƏLƏRİN TƏNQİDİ QİYMƏTLƏNDİRİLMƏSİ

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Abstrakt. Bu tədqiqat süni intellekt tətbiqlərinin sosioloji təhlil alətlərinin yenilənməsində effektivliyini qiymətləndirməyi hədəfləyir. Xüsusilə elmi tədqiqatlarını tamamlamaqda gecikən magistratura və doktorantura səviyyəsindəki tələbələr üzərində fokuslanır. Tədqiqatda üç əsas tətbiq nəzərdən keçirilmişdir: MonkeyLearn, NVivo AI və Atlas.ti. Təsviri-analitik yanaşmadan istifadə olunmuş, əsas məlumat toplama vasitəsi kimi isə məqsədli seçim əsasında seçilmiş tələbələrlə müsahibə forması tətbiq edilmişdir (Elm doktoru və LMD doktorantura proqramları). Tədqiqatın nəticələri göstərir ki, bu alətlər təhlil prosesini xeyli sürətləndirmiş, tələb olunan əmək və vaxtı azaltmışdır. Bundan əlavə, bu vasitələr elmi tədqiqatların dəqiq və inkişaf etmiş şəkildə aparılması və tamamlanmasında effektiv olmuş, sosioloji təhlilin keyfiyyətini artırmış və gecikmələrin qarşısını almağa kömək etmişdir. Tədqiqat bu alətlərin tətbiqi üçün lazımi təlimlərin və texniki dəstəyin təmin edilməsini tövsiyə edir. Süni intellektin rəqəmsal dövrdə güclü bir vasitə kimi meydana çıxması, xüsusilə sosioloji baxımdan elmi tədqiqatda keyfiyyətcə yeni bir yanaşmanı formalaşdırır. Bu transformasiya, ChatGPT-dən kənara çıxan tətbiqlərin inteqrasiyası və yenilənməsi vasitəsilə daha sürətli və dəqiq təhlil imkanı yaradır. Həmçinin, bu alətlər həm kəmiyyət, həm də keyfiyyət məlumatlarını insan zehni ilə rəqabət apara biləcək səviyyədə emal edə bilir və bu, obyektiv təhlildə rəqəmsal bir sıçrayış yaradır.

Açar sözlər: süni intellekt, sosioloji təhlil, MonkeyLearn tətbiqi, NVivo AI tətbiqi, Atlas.ti tətbiqi

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1.Introduction

Postgraduate students are among the groups most in need of such applications, especially those who have experienced delays in their scientific research across various fields, due to the challenges of manual analysis, which often require considerable effort and time.

Within this context, several applications have emerged, such as MonkeyLearn, NVivo AI, and Atlas. Ti is an intelligent analytical tool that enables researchers to analyse interview transcripts, field notes, or digital publications with greater accuracy and speed. Nevertheless, several questions arise regarding the extent to which these applications can genuinely assist students, the ease of learning to use them, the difficulties associated with their use, and students' satisfaction with both their utilisation and outcomes. On the basis of these considerations, the central research question is as follows:

Have the applications MonkeyLearn, NVivo AI, and Atlas contributed to accelerating and facilitating scientific sociological analysis in the completion of postgraduate studies?

From this central question, the following subquestions were derived:

- ➢ Which of these applications are most commonly used by postgraduate students?
- ➢ What are the motivations behind students' selection of one application over another?
- ➢ Do students recommend these tools to their peers for use in their research?
- ➢ What difficulties and challenges do they encounter when using these applications?

Research Objectives:

- ➢ To identify the most widely used applications among postgraduate students.
- ➢ To understand the motivations behind students' selection of a particular application over others.
- ➢ To highlight the significance of these applications as perceived by peers and students in conducting methodological research.
- ➢ To determine the difficulties and challenges faced when these applications are used.

Significance of the Research:

The significance of this research lies in its focus on a contemporary and digital topic, namely, the effectiveness of artificial intelligence tools in assisting postgraduate students who are delayed in completing their scientific research in the sociological field, a subject that has rarely been addressed in Arab studies.

This research contributes to the advancement of scientific studies by integrating artificial intelligence applications in a manner that enhances the quality of digital research, both in form and substance. Such integration opens new horizons for researchers in the social sciences to adopt modern technologies, thereby renewing research methodologies and improving the quality of scientific analysis.

Furthermore, this research enriches the academic literature on the critical utilisation of modern technology in social research within the Arab context.

Previous studies:

- Maher Khafaga Shehata's (2018) study, entitled "Qualitative Analysis Tools in the Humanities and Social Sciences: An Analytical Comparative Study," Faculty of Arts, Minia University, aimed to identify qualitative analysis tools available on the internet that Arab researchers can utilise to conduct qualitative studies. This study adopted a comparative analytical approach to examine the characteristics of qualitative analysis tools. The findings revealed that most of these applications struggle with handling Arabic digital content smoothly. The study recommended adopting ATLAS.ti for use in Arab research because of the relatively few problems encountered by Arab users.

- Boubaha's (2022) study, "Artificial Intelligence: Applications and Implications," published in the Journal of Economics, Finance and Business, Volume 07, Issue 04, aimed to identify the importance of artificial intelligence as one of the most prominent fields in the modern era and to explore its key applications and various implications. The study relied on a descriptive approach and concluded that the adoption of artificial intelligence applications across numerous fields now plays a fundamental and undeniable role in our contemporary world.

- The study by Ben Thamer Saadia and Ben Farhat Jamal (2024), entitled "Prospects for Adopting Artificial Intelligence and the Challenges of Its Application," published in Al-Turath Journal, Volume 14, Issue 05, aimed to explore artificial intelligence and its engagement with key technologies. The study adopted a descriptive approach and concluded that while artificial intelligence is of considerable importance, its adoption is accompanied by several notable and negative repercussions.

- Yasmin Hussein Othman Abbas's (2024) study, "The Impact of Artificial Intelligence Applications on the Production of Scientific Research in Universities," published in the Journal of the Higher Institute for Qualitative Studies, sought to examine the operation of artificial intelligence tools and their capacity to accelerate scientific

research in universities. The study also aimed to provide broad research guidelines for the basic sciences, with the potential for artificial intelligence to assist in motivating researchers to gain a deeper understanding of modern applications of AI-based fundamental sciences. The study concluded that artificial intelligence tools are valuable aids for researchers in the social sciences and humanities, as they are in other disciplines. Moreover, the use of artificial intelligence tools does not negate other research methods; rather, it enhances and increases the potential benefits derived from them.

Benefits derived from previous studies:

The present study benefits from previous research in several ways: forming an understanding of the theoretical framework for the current study; reviewing the methodologies and tools employed in these studies; constructing the research problem; building upon prior studies; determining the sampling method and the use of statistical techniques; and identifying the most significant artificial intelligence applications examined.

Figure 01

Illustration of the benefits derived from previous studies
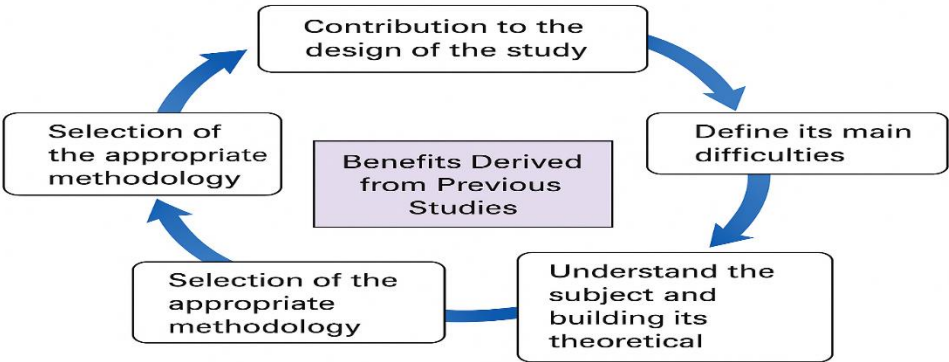
Source: Adapted from previous studies

Theoretical Framework:

1.Sociological analysis tools:

Habermas indicates that sociological analysis operates predominantly by interpreting modern society, focusing on a distinctive process that emphasises individual uniqueness and "the formation of individual religion," which aligns with this perspective [Haber, Jadidi, 2012, p.99].

Meanwhile, Pierre Bourdieu asserts that sociological knowledge is reflexive, wherein the researcher is conscious of their moments. Moreover, specific research fields require direct field investigations to become familiar with the study domain and its features before defining the topic, constructing its

problematics, establishing hypotheses, and selecting particular techniques for conducting the research, as noted by Lévi-Strauss. This underlines a fundamental aspect of scientific research in general: methodological flexibility, which reflects the researcher's capacity to interact with the research process in accordance with its specificities and the contextual conditions shaping the research process [Hamdash, 2006, pp.14-17].

Sociological analysis is considered one of the systematic intellectual processes undertaken by an individual known as the researcher to investigate facts related to a particular issue or problem, referred to as the research subject, by following an organised scientific method called the research methodology. This is intended to reach suitable solutions to the problem or results that can be generalised to similar issues, which are called research findings [Sadiq, 2014, p.33].

Artificial Intelligence in Scientific Research:

Artificial intelligence is defined as specific behaviours and characteristics exhibited by computer programmes that enable them to simulate human mental capacities and modes of operation. Among the most significant of these characteristics are the abilities to learn, infer, and react to situations that have not been preprogrammed into the machine [Shawqi, 2017].

1.The Emergence of Artificial Intelligence

Artificial intelligence is the result of two thousand years of philosophical tradition and theories of cognition and learning, as well as four hundred years of mathematics, which have led to the development of theories in logic, probability, and computation. It also has a profound history in the evolution of psychology and the understanding of the capabilities and functions of the human brain [Othmania, 2019]. Its philosophical roots extend back to the Greek philosophers and to the French philosophers Francis Bacon (1561-1626) and Bertrand, who introduced what is known as logical positivism. Its roots in mathematics span three main fields-computation, logic, and probability theory-as well as algebra, which was founded by the Arab scientist Al-Khwarizmi. In 1956, a conference was held at Dartmouth University, where John McCarthy proposed the term "artificial intelligence" to describe computers capable of performing functions of the human mind. In 1973, the first artificial intelligence system, "HEARSAY," for speech recognition, appeared [Othmania, 2019].

2.Fields of artificial intelligence:

Expert systems: Incorporating human expertise in a particular field into computer programs is considered one of the most significant areas of artificial intelligence. The objective is to develop a programme capable of providing advice, analysing data, offering consultation, or making diagnoses in a specific domain [Blidi, 2015, p.14].

Education: Harnessing the potential of computers in educational and pedagogical contexts.

Games: Programmes have been developed that are capable of competing in games such as chess and magic squares. These programs utilise sophisticated search techniques and algorithms to determine the best possible moves from among a variety of options, making the computer a formidable opponent that simulates human reasoning and is difficult to defeat [Blidi, 2015, p.15].

3. Characteristics and Domains of Artificial Intelligence:

- ➢ The capacity for reasoning and perception.
- ➢ The ability to acquire and apply knowledge.
- ➢ The ability to learn from and understand past experiences.
- ➢ Rapid response to new situations and circumstances.
- ➢ The ability to discern the relative importance of different elements in a given scenario.
- ➢ The provision of information and support for administrative decision-making [Jumaa, 2010, pp.169-170].

The artificial intelligence domains include the following:

- Intelligent computer-assisted education: Computer-assisted learning was one of the earliest areas in which computers were utilised more than twenty-five years ago. Educational topics have encompassed a range of traditional subjects, such as arithmetic, mathematics, languages, and educational game programs [Husseini, p.151].

4. Artificial Intelligence Technologies in Pedagogical Training:

The electronic or digital pen: This pen stores everything you write on paper, allowing you to transfer it to your personal computer later. It also enables you to see what you are writing in real time on your computer and can be used as a mouse in drawing programmes.

EBook:

An e-book is a book available in digital form and programmed into various information storage devices, allowing it to be accessed on a desktop computer or laptop.

Artificial Intelligence and Computer-Assisted Teaching:

The use of computers is considered an effective and supportive tool in teaching. Many programmes and systems have been developed within traditional frameworks for this purpose [Bonnet & Sabri, 1993, p.233].

Second: Most Important Applications for Sociological Analysis

1. MonkeyLearn:

This application analyses texts by focusing on a user-friendly and customised approach, in contrast to many competitors that require extensive programming knowledge for setup and use. MonkeyLearn offers a no-code interface, enabling users of all levels to access its features. The application also contains

a large-scale database of leading trends that help complete tasks such as sentiment analysis and topic classification, thus providing users with knowledge and insights rapidly without the need to start from scratch [Learn, 2014].

Figure 02: Illustration of the Importance of the 'MonkeyLarn' Application

Presenting data in various forms

Sentiment analysis

Accurate and rapid topic classification
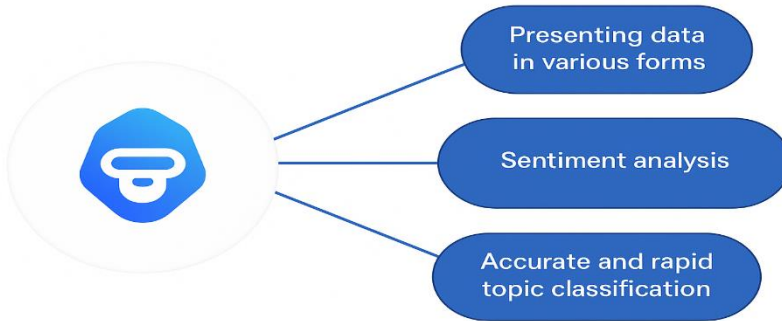
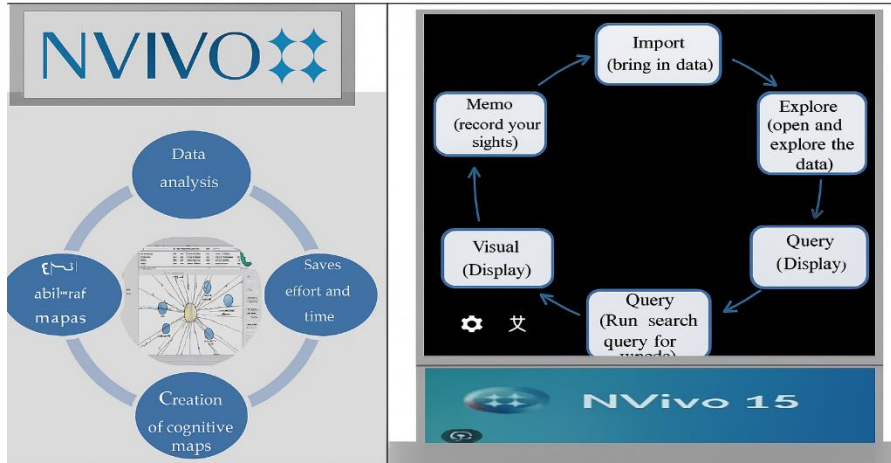Source: Based on the theoretical framework

NVivo AI Application:

This programme was developed for data analysis by an international qualitative research software developer. It is an application that supports qualitative and hybrid research methods by enabling the collection and analysis of interview content, focus group discussions, surveys, audio files, media, social media, and web pages. This application is considered one of the leading programs for qualitative and quantitative data analysis, produced by QSR International, and has contributed significantly to enhancing the quality and rigor of qualitative research. The use of NVivo AI involves a set of essential steps, including the following:

- ➢ **Project creation stage:** Creating an account within the NVivo AI application, which contains all the user's data.
- ➢ **Data Presentation Stage:** The researcher transcribed the interviews in writing and used pseudonyms to ensure the confidentiality of the information.
- ➢ **Importing Files to be Analysed:** After selecting the key files for analysis, the researcher clicks on "Store" and then uses the "IMPORT" command to select the required file.
- ➢ **Text Reading Stage:** The researcher reflectively reads the texts via NVivo AI to extract relationships, connections, and main headings related to the research topic and questions.
- ➢ **Data Coding:** The researcher codes the data via symbols to maintain information confidentiality.

> ➤ **Results Presentation Stage:** In this stage, the researcher advances towards presenting the results, where the programme displays the findings in the desired format [Saad, 2023].

Figure 03: Illustration of the NVivo AI Application

Source: Adapted from theoretical framework
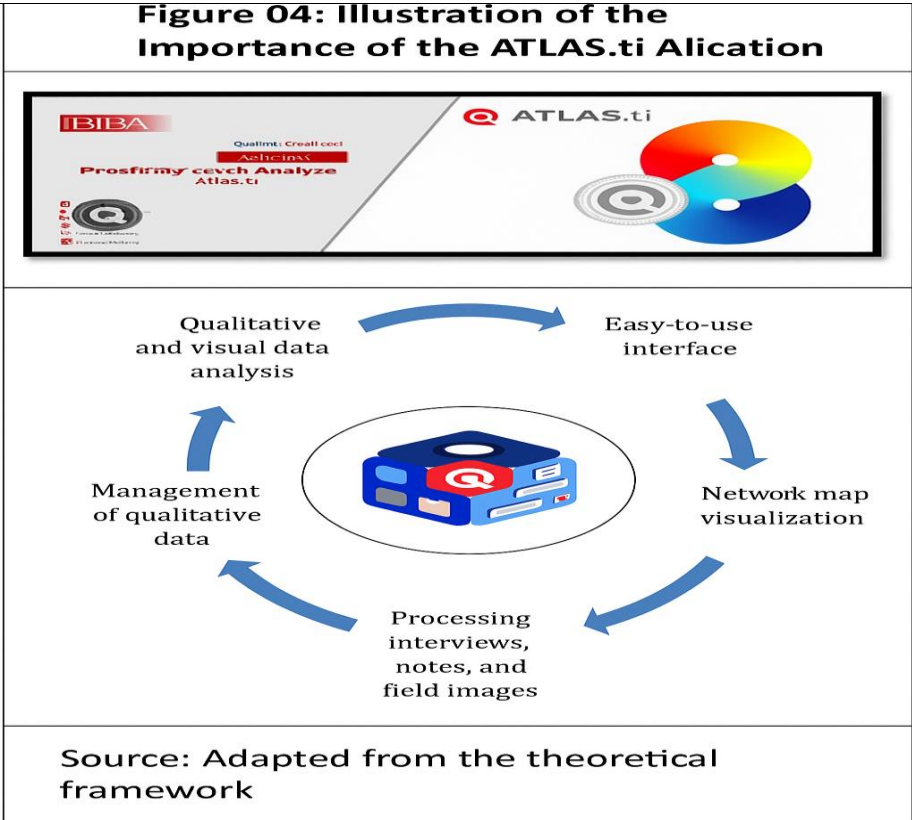
https://images.app.goo.gl/3ohHmfbD555PSY : source

The above figure highlights the importance of the NVivo AI application, which focuses on importing data and subsequently exploring it to gain insights and generate relevant codes. It facilitates information retrieval, coding, visualisation, and finally, storing the data in the form of memos to be presented in advanced and precise formats.

ATLAS.ti Application:

ATLAS.ti can be regarded as one of the most significant and prominent programs used for the statistical analysis of important data, providing an advanced and powerful tool for qualitative analysis of various types of data, especially when dealing with large volumes of text, graphics, audio, and video data. The content handled by this software is not confined to any specific field or academic discipline. The program's typical areas of application are characterised by a systematic and creative approach to analysing unorganised, unordered, and unstructured data. ATLAS.ti handles both quantitative and qualitative data across a variety of forms and domains.

Below is an explanatory overview of the diverse range of software that has been developed and programmed by specialists and experts to assist researchers in conducting and applying statistical content analysis for research data. The main goal is to clarify and present various aspects, such as displaying and explaining the multiple data and variables included in research studies [Al-Manara, 2023].

Figure 04: Illustration of the Importance of the ATLAS.ti Alication

Qualitative and visual data analysis

Easy-to-use interface

Management of qualitative data

Network map visualization

Processing interviews, notes, and field images

Source: Adapted from the theoretical framework

Fieldwork Section:

A.Study Methodology: A descriptive-analytical method was adopted to investigate the students' experiences in the field.

B.Study Sample: A purposive sample consisting of 15 postgraduate students (Master's and Doctoral students) who were delayed in completing their theses in the social sciences (Sociology, Psychology, and Educational Sciences) was selected and distributed equally among the disciplines.

The distribution was as follows:

Figure 5

Distribution of Sample Participants by Specialisation

Sociology 33%, Psychology 33%, Educational Sciences 33%
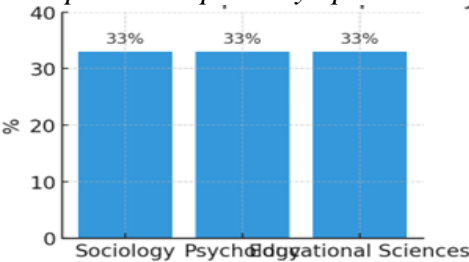
The above figure illustrates the distribution of the study sample, which was adopted in this research, showing that participants were selected equally from each specialisation.

2.Interview Form:

The interview form was used as the most appropriate instrument for this study, comprising five sections as follows:

- ➢ Section One: Demographic information
- ➢ Section Two: Application usage
- ➢ Section Three: Reasons for selecting these applications
- ➢ Section Four: Evaluation and satisfaction
- ➢ Section Five: Focus on challenges and difficulties

Fifth: Presentation, Analysis, and Interpretation of the Study Results

A.Presentation and Analysis of the Study Results:

Section One: Demographic Information

Figure 6

Distribution of Sample Participants by Gender
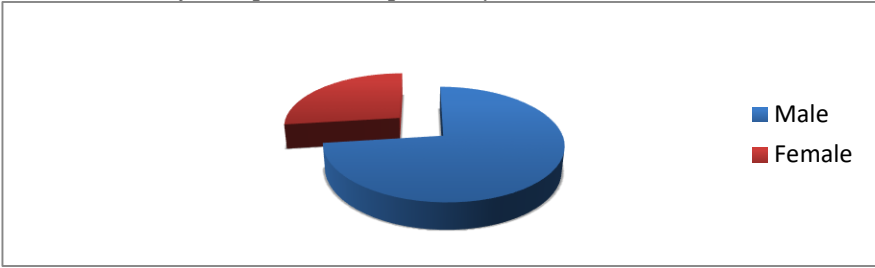
The proportion of females was greater than that of males, reaching 73%. This is due to the ease of communication with them both in person and through online platforms.

Figure 07: Distribution of Sample Participants by Academic Level
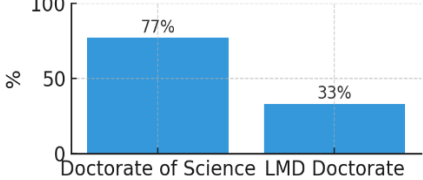
According to the figure above, a large percentage (77%) represent Doctorate of Science students from the Master's category, whereas 33% correspond to LMD Doctorate students who also experienced delays in completing their research, despite being limited to four years with the possibility of a one-year extension owing to personal or uncontrollable circumstances.

Figure 8

Duration of Delay in Completing Scientific Research
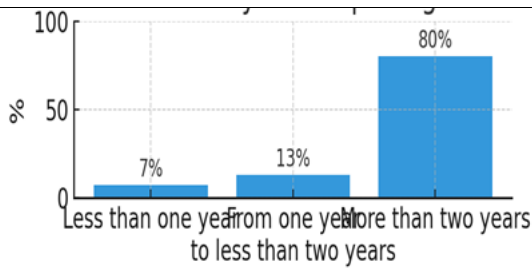
The above figure indicates that 87% of the participants exceeded two years and the legal period for submitting their scientific research, rendering them at risk of delay or failure to complete their research. In contrast, 23% experienced delays ranging from one year to less than two years and were also categorised as delayed postgraduate research students.

Section Two: Application Usage

Table 1

Extent of Participants' Knowledge and Use of These Applications in Their Thesis or Article

No.	Application	Yes	%	No	%
01	NVivo AI	13	87%	2	13%
02	ATLAS.ti	8	53%	7	47%
03	MonkeyLearn	13	87%	2	13%

The results shown in the table above indicate that the majority of respondents reported knowledge of the NVivo AI and MonkeyLearn applications, both of which were 87%. This is attributed to their function as artificial intelligence tools designed for analysing interviews, studying public opinion trends, and processing digital publications, in addition to presenting data in advanced digital formats. The respondents also highlighted the speed of these applications in analysing digital discourse, anthropological documents, and psychological studies. In contrast, 53% indicated knowledge of ATLAS. TI, which is also regarded as an effective tool for analysing documents in digital data form, has gained notable popularity within academic circles. Although it was not as widely mentioned, it remains among the most significant applications identified.

Section Three: Reasons for Selecting These Applications in Scientific Research

Table 2

Reasons and Motivations for Selecting These Applications in Scientific Research

No.	Statement	Yes	%	No	%
01	Supervisor's recommendation	4	27%	11	73%

02	Suggested in methodological training courses	0	0%	0	0%
03	Learned about them from colleagues	8	53%	7	47%
04	Personal research	3	20%	12	80%
05	Through ChatGPT, as a result of time pressure	12	80%	3	20%

The results of the table above indicate that 80% of the participants became aware of these applications through colleagues who had previously used them in their research. In addition, 80% relied on ChatGPT to learn more about these applications because of time constraints and their urgent desire to graduate. The personal search for quick solutions to complete scientific research also contributed to the discovery of these applications.

Table 3

Types of Data Analysed in Scientific Research

No.	Statement	Yes	%	No	%
01	Interviews	15	100%	0	0%
02	Field notes	15	100%	0	0%
03	Digital posts from websites and social media	15	100%	0	0%
04	Other	—	—	—	—

The results of the table above indicate that all the respondents confirmed their reliance on artificial intelligence applications, namely, MonkeyLearn, NVivo AI, and ATLAS.ti, for the analysis of interviews, field notes, and digital posts. This enabled rapid and accurate completion of the fieldwork component.

Table 4

Time Spent Learning to Use These Applications in Scientific Research

No.	Statement	Yes	%	No	%
01	Less than a week	0	0%	0	0%
02	One week to one month	15	100%	0	0%
03	More than one month	0	0%	0	0%
04	Other	—	—	—	—

The results above indicate that all respondents took more than a week to learn how to use these applications, as they are new tools for which the participants had neither prior experience nor access to trainers.

Section Four: Evaluation of the Adoption of the Applications "MonkeyLearn, NVivo AI, ATLAS.ti"

Table 5

Effectiveness of these Applications as an Essential Alternative to Traditional Tools

No.	Statement	Yes	%	No	%	Partially	%

| 01 | Do you consider using these applications an effective alternative to traditional tools (e.g., manual coding)? | 8 | 53% | 0 | 0% | 7 | 47% |

The results of the table above indicate that the adoption of these applications is regarded as an effective, rapid, and essential alternative for completing and accomplishing scientific research. However, 47% reported that they do not adopt them entirely because of the challenges and difficulties they encounter.

Table 6

Satisfaction with These Applications and the Accuracy of Their Results

No.	Statement	Yes	%	No	%	Partially	%
01	Very satisfied	0	0%	0	0%	0	0
02	Somewhat satisfied	0	0%	0	0%	15	100%
03	Not satisfied	0	0%	0	0%	0	0

The results of the table above indicate that the respondents were somewhat satisfied. According to their perspective, despite these applications contributing significantly to their research and enabling faster digital analysis, they still require updates in several technical aspects.

Table 7

Importance of These Applications and Recommendations for Their Use and Generalisation in Sociological Scientific Research

No.	Statement	Yes	%	No	%	Not sure	%
01	Do you recommend your colleagues use these applications in their research?	8	53%	0	0%	7	47%

The results of the table above indicate that these applications are considered valid and are recommended by 53% of the respondents. In contrast, 47% are not sure about fully adopting these applications because of technical problems, the lack of Arabic language integration, or perceived shortcomings.

Section Five: Challenges and difficulties

Table 08

Challenges and Difficulties Faced by Students When Using the Applications "MonkeyLearn, NVivo AI, ATLAS.ti".

No.	Statement	Yes	%	No	%
01	Difficulty in learning	5	33%	10	77%
02	Lack of technical support	15	100%	0	0%
03	Language problems	10	77%	5	33%

04	Discontinuation of the free version and high programme cost	15	100%	0	0%
05	Other	—	—	—	—

The results of the above table indicate that the discontinuation of the free version of the application hinders the completion of data analysis, as a significant subscription fee is required to continue analysing the remaining data, an issue reported by 100% of respondents. Other challenges faced by researchers include the lack of technical support, language barriers, and difficulties with the rapid learning of these applications.

B. Study Conclusions

- The results indicate that, compared with ATLAS, both "MonkeyLearn" and "NVivo AI" are more widely adopted and used. Ti, particularly for the analysis of interview data and field texts.
- Most students selected these applications on the basis of recommendations from colleagues and the use of artificial intelligence applications such as ChatGPT.
- In addition, the results revealed several difficulties encountered by researchers, especially the high cost of these programmes, technical challenges, and the need for specialised training.
- These applications were considered adequate on the basis of the evaluations of doctoral students.
- The study concluded that integrating these applications into university training programs enhances students' efficiency, particularly those who are delayed in completing their scientific research.

Conclusion

In conclusion, artificial intelligence applications and their various programs have facilitated numerous scientific studies across a range of fields. This study highlights a selection of applications, MonkeyLearn, NVivo AI, and ATLAS.ti, that represent a significant technical and sociological leap in the world of data analysis, interpretation, and advanced presentation, particularly for postgraduate students facing challenges in completing their theses or articles within the required timeframe.

The results demonstrated that these applications contribute to expediting the processes of coding and pattern extraction and reducing the effort involved compared with traditional manual methods. Nevertheless, the study revealed key challenges limiting the effectiveness of these tools, such as the difficulty of teaching them without specialised training, insufficient support for the Arabic language in some applications, and their often high cost. The findings also revealed variations in students' satisfaction across different applications, depending on the nature of their data and their technical skills.

Recommendations and suggestions:

- It is essential to integrate these supportive applications into Master's and Doctoral programs within social sciences faculties to maximise student benefit.
- The development of digital language features should be improved to include the fundamentals of the Arabic language without errors.
- It is crucial to enhance methodological awareness regarding the importance of these applications as supportive tools without relying entirely on them.

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