

Thematic Analysis and Artificial Intelligence: A Step-by-Step Process for Using ChatGPT in Thematic Analysis

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Muhammad Naeem¹, Tracy Smith¹, and Lorna Thomas¹

Abstract

This study sets out how to use generative artificial intelligence (AI) in the six steps of systematic thematic analysis. It leverages AI to address the limitations of traditional thematic analysis. This paper developed prompts (inputs) for ChatGPT (a generative AI chatbot based on a large language model) that are based on many researchers' discussions and criticisms of qualitative data analysis. The contributions of this paper are twofold. First, it addresses a critical research gap by showcasing ChatGPT prompts for each step of the six steps of systematic thematic analysis, which also addresses researcher training in thematic analysis. Second, it contributes to the development of input to train AI in thematic analysis, including a description of how to familiarize an AI system with the context of a research study and the researcher's methodological and theoretical considerations; this approach helps to reduce human bias and improves accountability and transparency in thematic analysis.

Keyword

thematic analysis, themes codes, artificial intelligence, ChatGPT prompts, qualitative research

Introduction

Researchers have begun to explore the use of Artificial Intelligence (AI) in research by, for example, conducting literature reviews (Švab et al., 2023), literature synthesis (Semrl et al., 2023), data management and analysis (Currie et al., 2023b), data interpretation (Laios et al., 2023), and considerations of academic integrity and workflow efficiency (Currie et al., 2023a). The use of AI applications in scientific writing has also been explored (Huang & Tan, 2023; Salimi & Saheb, 2023). AI can be used to improve the articulation, coherence and clarity of academic writing for writers whose first language is not English (Meyer et al., 2023; Salimi & Saheb, 2023). The use of AI in qualitative research expedites the data analytical process (Prescott et al., 2024), but it also raises issues of conceptuality, ethics and transparency (Meyer et al., 2023; Salimi & Saheb, 2023). Moreover, Naeem et al. (2025) used ChatGPT to conduct systematic thematic analysis in their study, explaining the use of AI as follows: "AI-assisted technology was employed specifically to select keywords and quotations from the data" (Naeem et al., 2025, p., 12).

Recent studies have explored the use of Generative AI (GenAI) in qualitative research. For example, De Paoli, 2024, 2024b compared the results of manual thematic analysis with the results of GenAI-based thematic analysis. De Paoli, 2024, 2024b used open access data sets and semi-structured interviews that had been analysed by other researchers. De Paoli, 2024, 2024b used GenAI to carry out initial coding of data sets and to generate themes, and compared the themes produced by GenAI-based thematic analysis with those derived from manual thematic analysis. De Paoli (2024a) found that GenAI inferred most of the main themes identified by manual coding. However, these studies did not include the familiarization phase of thematic analysis, which would have allowed the

¹Christ Church Business School, Canterbury Christ Church University, Canterbury, UK

Corresponding Author:

Muhammad Naeem, Christ Church Business School, Canterbury Christ Church University, North Holmes Road, Canterbury CT1 1QU, UK.
Email: dr.muhammadnaem222@gmail.com



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generative AI to engage with the data and overall research context. To overcome this issue, Lee et al. (2024) used AI to transcribe interviews to familiarize an AI system with raw data. However, they only used AI to perform three of the steps accounted for in Braun and Clarke's (2006) six steps to thematic analysis. Prescott et al. (2024) qualitatively tested the efficacy and efficiency of thematic analysis codes generated by humans and GenAI. Prescott's et al. (2024) findings indicated that human-generated codes are more reliable than AI-generated codes. These studies have three limitations. The first is that they did not follow all six steps of Braun and Clarke's (2006) approach to thematic analysis. The second limitation is that the studies did not provide the AI system with contextual information about the research, such as the aim and the research questions. The third limitation was that the AI system was not informed about the researchers' methodological considerations for each step of thematic analysis.

This paper addresses researcher training in thematic analysis, and the development of input to train AI in thematic analysis. The paper explores each step involved in thematic analysis, and considers the methodology underpinning each step. In this sense, it addresses Christou's plea (2023a, p. 567) when he noted "I strongly encourage, particularly novice researchers, to first equip themselves with the fundamentals of thematic analysis and how to use AI tools in their thematic analysis". In addition, the paper describes how researchers can familiarize an AI system with the context of research, including aspects such as the research aim, and the researcher's methodological considerations. Christou (2023b) argues that, to fully utilize AI to generate knowledge, researchers must carefully consider input methods. This paper describes various input (prompts) given to ChatGPT to complete the six steps of thematic analysis, and it provides the rationale for these prompts. ChatGPT is a GenAI chatbot based on a large language model. Textual inputs to ChatGPT are called "prompts". These prompts can be thought of as a conversation in which a person asks a question, gives instructions or explains the context of a situation to their assistant, so that the assistant can help them perform a task.

Braun and Clarke (2006) introduced a six-step approach to thematic analysis comprising of familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing a report. Additionally, Braun and Clarke (2022) suggested considering reflexivity, theoretical frameworks, data contextualization, and theme development in the process of thematic analysis. They also indicated that thematic analysis encompasses a family of methods rather than a singular approach, with no standardized version. This paper follows a modified version of the six steps introduced by Naeem et al. (2023), which is known as systematic thematic analysis. Naeem et al.'s (2023) systematic thematic analysis also comprises six steps: (1) transcription, familiarization with data, and the selection of quotations, (2) the selection of keywords, (3) coding, (4) theme development, (5) conceptualization through the interpretation of keywords, codes

and themes, and (6) the development of a conceptual model (see Figure 1). The significant difference with a systematic review is that through this process, researchers explore and identify themes based on required data, considering research gaps, objectives, and questions, instead of finding common themes from the data. Therefore, this systematic thematic analysis allows researchers to create themes based on identified quotations and keywords, grouping them into different categories known as codes (Naeem et al., 2023). These codes are based on relevant quotations and keywords. Subsequently, these codes are grouped according to research questions and objectives, forming what is called a theme. Thus, through systematic thematic analysis, themes are derived from the data based on research gaps, theoretical underpinnings, philosophical underpinnings, and research questions, whereas in traditional thematic analysis, themes are based on commonalities in the data (Naeem, 2025; Naeem et al., 2025; Naeem & Ozuem, 2025).

Building on the groundwork of the above-mentioned studies and addressing their limitations, the current paper incorporates their insights into ChatGPT prompts to enable the chatbot to conduct systematic thematic analysis. (Naeem et al., 2023). The results of a systematic thematic analysis conducted by ChatGPT are compared with the corresponding manual outcomes of Naeem et al. (2024a). This paper was selected as a case study since it uses the same systematic thematic analysis process in their study. The primary data set used by Naeem et al. (2024a) was used as the primary data set for this paper, and this has facilitated a comparison between the outcomes of a manual thematic analysis of Naeem et al., 2024b to compare with a ChatGPT-generated thematic analysis. The research context, methodology, and philosophical and theoretical underpinnings of Naeem et al., 2024b study was also part to develop ChatGPT prompt in this methodology paper.

How can ChatGPT be Used in the Process of Thematic Analysis?

The development of an AI-based toolkit for systematic thematic analysis was first introduced by (Naeem et al., 2023). This toolkit not only facilitates the application of AI in systematic thematic analysis, but also offers researchers a well-structured and rigorous approach to use the developed prompts for each stage. These prompts have been developed following consideration of the different points of view that need to be considered at each stage. The paper sets out how to use ChatGPT for thematic analysis by providing step-by-step guidance, and a conceptual model (see Figure 2).

Figure 2 outlines a comprehensive approach to using ChatGPT for systematic thematic analysis. A more detailed explanation of each step is provided below.

- **Step 1: Familiarization, and Selection of Quotations:** The first stage of systematic thematic analysis involves familiarizing ChatGPT with the data, research context and the theoretical, methodological and philosophical

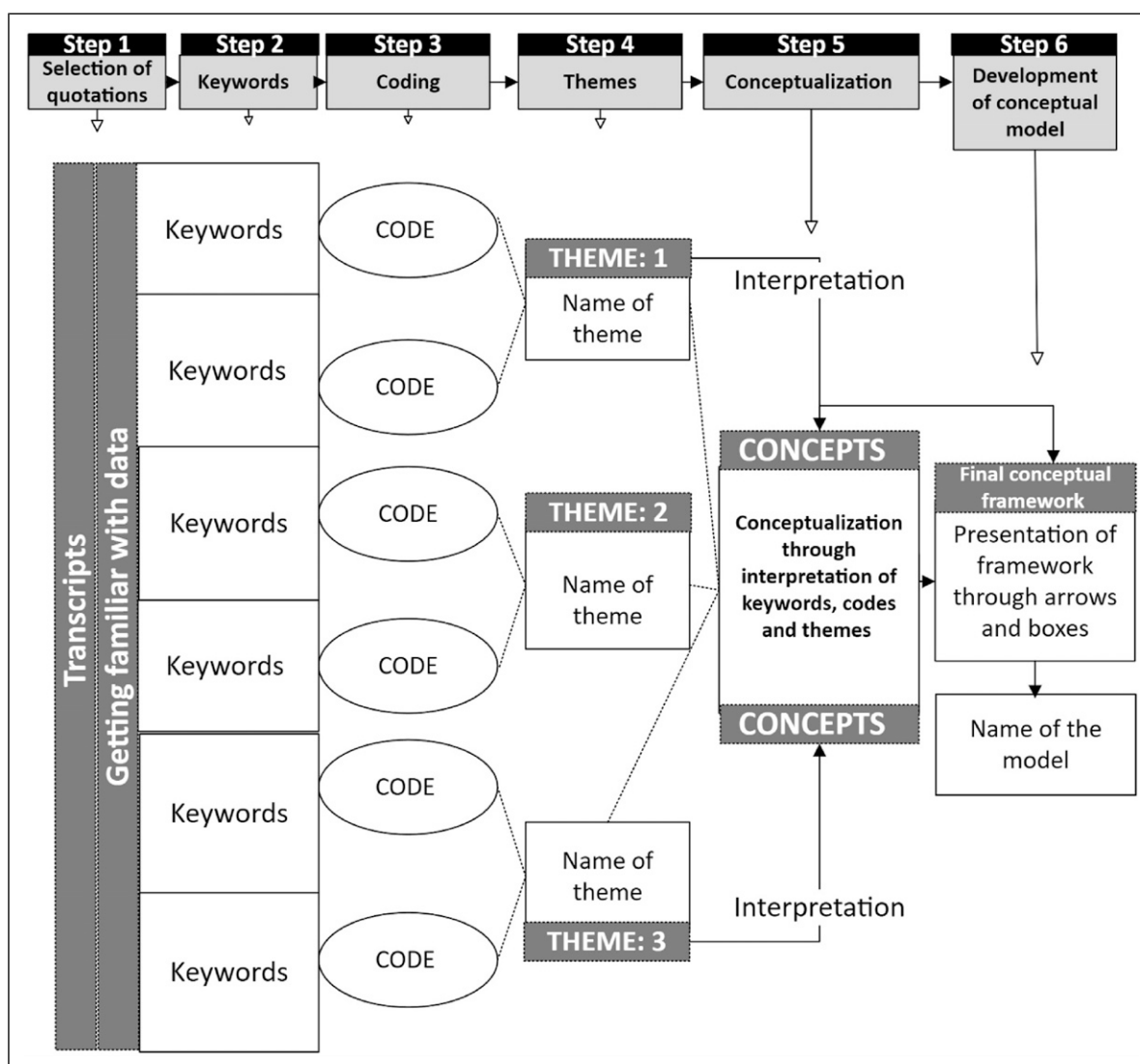


Figure 1. Systematic Thematic Analysis Process (Naeem et al., 2023, p. 4).

underpinnings of the research including the research context. It is also necessary at this stage to familiarize ChatGPT with the six steps of systematic thematic analysis introduced by Naeem et al., (2023). Researchers then need to ask ChatGPT, using the instructions provided in Table 1, to confirm that it understands the context, and is ready to perform a systematic thematic analysis.

- Step 2 Selection of Keywords: Keywords are rich words or phrases that are selected on the basis of the 6 Rs (realness, richness, repetition, rationale, rep-artee and regal). Keywords ensure the robustness and relevance of extracted data (Naeem et al., 2023). This stage involves asking AI to select keywords form the data on the basis of the prompts given in Table 2.
- Step 3 Coding: Keywords and quotations are considered to label phrases or words to produce

codes. The codes should reflect the meaning of the grouped quotations and keywords in order to address research questions. Codes should be selected on the basis of the 6 Rs (reciprocal, recognizable, responsive, resourceful). During this stage it is necessary to instruct AI to suggest code names based on the instructions in Table 3.

- Step 4 Theme Development: This stage involves organising the codes into categories on the basis of their inter-relationships. This is achieved by considering selected theory/theories to label the categories as themes. The codes should reflect the meaning of the grouped quotations and keywords in order to address research questions. Themes should be selected on the basis of the 6 Rs (). The researcher must guide the AI by providing the keywords, codes, research context, research aims and theoretical

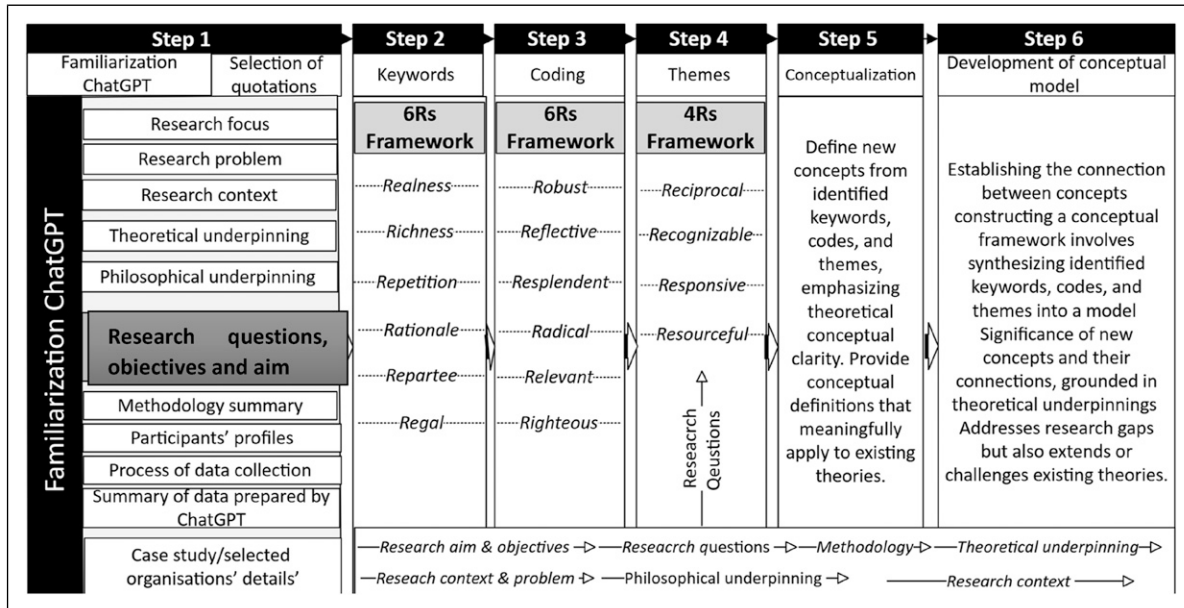


Figure 2. Using ChatGPT for Systematic Thematic Analysis: A Step-by-Step Process Using Artificial Intelligence in Qualitative Research.

underpinnings to ensure that themes can be developed (see Table 4).

- Step 5 Conceptualization: Conceptualization involves interpreting codes and themes in a coherent manner to help readers understand, categorize, and communicate a meaningful representation of the subject at hand (Naeem et al., 2023). The purpose of conceptualization is to define and clarify new concepts derived either from themes and codes or from theory. This involves refining codes, defining connections, identifying similarities and differences between the themes and codes, and creating a concept supported by existing theories. The researcher therefore needs to instruct the AI to conceptualise the various codes and themes using selected keywords and the theoretical underpinning of the (see Table 6).
- Step 6 Development of Conceptual Model: The final step involves synthesizing and presenting all of the concepts into a coherent model or framework by identifying the relationships between the concepts as arrows and boxes. This involves establishing the significance of the relationship between these concepts to create solutions to the research question, and to provide a theoretical contribution. During this stage, the researcher can ask the AI to present these concepts in a structured way using the prompts developed in Table 6.

This paper presents a case study of Naeem et al.'s (2024a) research to compare each step of systematic thematic analysis and AI based thematic analysis outcomes. Naeem et al. (2024a) explored the constraints and enablers of using scan

and go apps to shop in supermarkets in England. Their study, which adopted a constructivist ethnographic approach, was underpinned by flow- and affordance theory. They introduced the Affordances Flow Funnel concept to conceptualize customers' experiences of shopping using scan and go apps. Systematic thematic analysis was conducted on online reviews of 10 scan and go apps.

A Comparison Between Outcomes of GenAI-Based and Manual Systematic Thematic Analysis

Step 1: Familiarization With Background Information and Transcript for Quotation Selection

The first step of systematic thematic analysis involves the researcher familiarizing themselves with the data/transcript while considering the associated theoretical, contextual and philosophical underpinnings (Davidson, 2018; Naeem et al., 2023, 2024b; Nowell et al., 2017; Slembrouck, 2007; Thorne, 2000). This approach is necessary because reading a transcript is an interpretative task (Eldh et al., 2020), so the researcher must consider the research aim, objectives and research questions (Du Bois, 1991; Ochs, 1979, 1999). Additionally, researchers need to consider theoretical and philosophical positions to interpret transcripts effectively (Naeem et al., 2023), which can help reduce research biases introduced by the transcriber's perspective (Duranti, 2006; Jaffe, 2000, 2007; Mondada, 2007) when selecting relevant quotations (Naeem et al., 2023).

Since the selected quotations can either reinforce or challenge existing knowledge, having some theoretical

Table 1. ChatGPT Prompts in First Step of Systematic Thematic Analysis

Prompts to familiarise ChatGPT with the research	Prompts to enable ChatGPT to select quotations from the transcript	Rationale for prompts
<p>This research analyses primary data to achieve the research aim by answering the following research questions. The primary aim of this study is [research purpose]. Based on [theoretical underpinning of research], this study follows [a brief mention of the methodology employed in the study (e.g., constructivist ethnographic approach, exploratory research, inductive approach, qualitative research method)].</p> <p>Research aim & objectives: [Paste the research aim, objective]</p> <p>Research question: [Paste the main research question (and optionally information on the research problem)].</p> <p>Context of the research:</p> <ul style="list-style-type: none"> • Data type: [Paste the qualitative data from app reviews, semi-structured interviews, focus group discussions, including transcripts] • Participating and selected Organizations: [Number of participants, background of participants, name of industry, background of selected organisations] <p>Philosophical underpinnings:</p> <ul style="list-style-type: none"> • [Include an explanation of the epistemology by copying and pasting the methodology section of your research] <p>Theoretical framework:</p> <ul style="list-style-type: none"> • Theoretical Framework: [Explain theoretical frameworks used to guide the research] <p>Data file: [attach the data file to be thematically analysed]</p> <p>Prior to reading the manuscript, please review the above background material to familiarize yourself with the research problem, research question and research methodology and context. I will ask you to undertake systematic thematic analysis involving: the selection of quotations, selection of keywords, development of codes, development of themes, and the conceptualization and development of a conceptual framework using the following six steps to systematic thematic analysis introduced by Naeem et al., (2023). [ask ChatGPT to write a summary of Naeem et al. s (2023) systematic thematic analysis, including the 6 Rs to select keywords, the 6 Rs of coding and the 4 Rs of themes]. (ChatGPT prompt supported/developed)</p>	<p>Taking into account the following collective research aim, objectives, methodology, the theoretical framework and philosophical underpinnings, please identify relevant questions to extract excerpts from that data file that answer the research question. The selection process must be guided by the specific context of the study, including its philosophical foundations, research aim, research objectives, research questions, as well as its methodological and theoretical approaches.</p> <ul style="list-style-type: none"> • Research aim & objectives: [Insert the specific aim and objectives of the research] • Methodology: [Insert the methodology used in the study] • Theoretical Framework: [Insert the theoretical framework] • Research Philosophy: [Insert the philosophical approach guiding the study] • Research Question: [Insert the specific research question(s) the study aims to answer] <p>Data file: [Paste the data set, or attach a data file, from which quotations will be selected]</p>	<p>Naeem et al. (2023, 2024a, 2024b) argued that researchers need to familiarize themselves with the theoretical, contextual and philosophical backgrounds of their research in order to justify their choice of relevant quotations. The need for familiarization in quotation selection was also suggested by other researchers (Davidson, 2018; Duranti, 2006; Jaffe, 2000; Mondada, 2007; Nowell et al., 2017; Slembrouck, 2007; Thorne, 2000).</p>

Source: ChatGPT supported/developed table.

Table 2. Second step – ChatGPT Prompt, and Keywords Selected by Humans and ChatGPT

ChatGPT prompt to perform second step	Justification of prompt	Keywords selected by ChatGPT	Keywords manually selected by Naeem et al. (2024a)
<p>Based on the systematic thematic analysis process introduced by Naeem et al. (2023) and the crucial role of keyword selection in systematic thematic analysis, please consider the following information to aid your selection of appropriate keywords.</p> <p>Please make sure that the keywords reflect the participants' points of view and insights to directly answer the research question and understand the research phenomenon under study. Please utilize the 6 Rs framework – Realness, Richness, Repetition, Rationale, Repartee and Regal – to guide your selection. Please consider the following information about the research in your selection of keywords.</p> <p>Research question: [Insert research question]</p> <p>Phenomenon under study: [Describe the research aim and research context]</p> <p>Data file: [Paste the data set or attach the data file]</p> <p>In selecting keywords, please ensure they:</p> <ul style="list-style-type: none"> • are meaningful and help to answer the research question, and • act as analytical anchors, that is, they are helpful in building a narrative based on the participants' own words to answer the research question. (ChatGPT supported/developed prompt). 	<p>Various authors have identified the following considerations when selecting keywords in thematic analysis.</p> <p>Core idea and experience: Select keywords that represent participants' major ideas and capture the major chunks of participants' experiences (Naeem et al., 2023, 2024b).</p> <p>Data saturation and integration: Use helpful keywords to integrate various data points and various participant perspectives (Morse, 2015; Naeem et al., 2023).</p> <p>Organic selection: Ensure the selected words and phrases are meaningful to build narrative on the bases of different keywords captured from participant data (Naeem et al., 2023).</p> <p>Linking theory and data: Keywords should be related to the research problem, research questions, theories, methodology and research problem (Charma, 2014; Glaser & Strauss, 2009; Naeem et al., 2023; Richards, 2015; Maxwell, 2013).</p>	<p>"Shopping experience"</p> <p>"Technical issues"</p> <p>"Savings"</p> <p>"Digital coupons"</p> <p>"ExpressPay"</p> <p>"Location detection"</p> <p>"Pickup"</p> <p>"Navigation problems"</p> <p>"Screen brightness"</p> <p>"Search functionality"</p> <p>"Order processing"</p> <p>"Pop-up windows"</p> <p>"Advertising"</p> <p>"App review request"</p> <p>"In-store pickup"</p> <p>"Product availability"</p> <p>"Sam's Club"</p> <p>"Warehouse deals"</p> <p>"Shopping list"</p> <p>"Fingerprint login"</p> <p>"Grocery delivery"</p> <p>"Shopping cart"</p> <p>"Authentication"</p> <p>"Location service"</p> <p>"Members sign up"</p> <p>"Easy process"</p> <p>"Repeat shopping"</p> <p>"Reliability issues"</p> <p>"Card scan feature"</p> <p>"Nutritional facts"</p> <p>"Photo zoom"</p> <p>"Window resizing"</p> <p>"Google Pixel Fold"</p> <p>"Sign-in issues"</p> <p>"Loading speed"</p> <p>"Promo page"</p> <p>"Holiday deals"</p> <p>"Glitchy app"</p> <p>"Cart disappearance"</p> <p>"In-stock items"</p> <p>"Search functionality"</p> <p>"Back navigation"</p> <p>"Shop tab"</p> <p>"Blank screen"</p> <p>"Item search"</p> <p>"App loop"</p> <p>"Screen refresh"</p> <p>"App reliability"</p> <p>"Purchase history"</p> <p>"Account details"</p> <p>"Slow app"</p> <p>"Page crashes"</p> <p>"Cart view"</p> <p>"Credit card change"</p> <p>"App usability"</p> <p>"Webview"</p> <p>"Navigating experience"</p> <p>"Brightness adjustment"</p>	<ul style="list-style-type: none"> • "Not my job, job-eating app, extra burden, lack of motivation, not learning, do not use, not tech savvy, challenge". • "Quick process, lost earnings, happy to try, time wasting, various benefits, installation issues, no queue, job loss, shopping by own app, fear to lose mobile". • "Enjoyable in smartphones, fell down, free internet, hard to connect everywhere, customer support, non-existent, free trial services, sometimes deduct charges, shopping life easy, scanning burden, use of own device, battery drain". • "Quickly scan items, barcode scanning issue, relevant deals, no added value, love the shopping, many bugs, convenient queue for QR scan, time saving, stuck in the middle, mutual list, privacy". • "Too long to load, complicated app design, not for old and uneducated people, use mobile banking in my brother's home, text is not readable for me". • "Garbage app, not working, looking to increase buying, data could be lost, charge without buying, quit it, not offering value, lack of information/could not find, doesn't sync in real time".

Source: ChatGPT supported/developed table.

Table 3. Third Step – ChatGPT Prompt, and Codes Selected by Humans and ChatGPT

ChatGPT prompt to perform third step	Justification of prompt	ChatGPT-suggested codes with related keywords	Codes manually selected by Naeem et al. (2024a)
<p>We now move to the third step: Coding. The aim of coding is to use one or more words to jointly represent a group of keywords and quotations to answer the research question. Please take an abductive approach to developing potential meaningful codes, while considering the following information and data set. These codes should reflect the essence of participants' points of view in a conceptual form. Codes should consist of a maximum of three words.</p> <p>Please ensure that the suggested codes:</p> <ul style="list-style-type: none"> • Contribute to answering the research question and are developed through consideration of keywords and all selected quotations. • Reflect the 6 Rs coding framework – robust (comprehensive to enable interpretation of the data), reflective (reflect the selected keywords and related quotations), resplendent (rich and conceptually powerful), relevant (related to the research), radical (new contribution), and righteous (ethical and contextually correct). • Accommodate abductive reasoning by integrating data-driven insights and theoretical frameworks. <p>Data set segments: [Paste data set segments or specific excerpts]</p> <p>Identified keywords: [List identified keywords from Step 2]</p> <p>Selected quotations: [List identified quotations from Step 1]</p> <p>Research question and aim: [Insert research question and research aim]- (ChatGPT supported/developed prompt)</p>	<p>Saldaña (2013) and Naeem et al. (2023) proposed definitions of coding. Codes should be developed to present the combined meanings of related quotations and selected keywords (Naeem et al., 2023).</p> <p>Codes offer new insights to answer the research questions (Saldaña, 2013).</p> <p>Codes can be done on base of inductive, deductive or abductive reasoning (Attride-Stirling, 2001; Braun & Clarke, 2006; Creswell & Poth, 2018; Elo & Kyngäs, 2008; Tavory & Timmermans, 2014; Thomas, 2006).</p> <p>Coding should create robust, reflective, resplendent, relevant, radical and righteous codes, known as the 6 Rs of coding (Naeem et al., 2023).</p>	<p>User Interface Satisfaction: “user-friendly”, “intuitive”, “organized”</p> <p>Technical Frustrations: “glitchy”, “app crashes”, “technical issues”</p> <p>Budget-Conscious Shopping: “budget-friendly”, “savings”, “digital coupons”</p> <p>Accessibility and Inclusion: “seniors”, “accessibility issues”, “friendly associate”</p> <p>Customer Service Appreciation: “customer service”, “service appreciation”, “customer feedback”</p> <p>App Functional Reliability: “app stability”, “app crashes”, “technical support”</p> <p>Convenience of Shopping: “convenience”, “scan and go”, “easy process”</p> <p>Feedback and Suggestion: “feedback”, “user suggestion”, “app feedback”</p> <p>Membership and Loyalty: “membership benefits”, “loyalty program”, “membership verification”</p> <p>Inventory Management Concerns: “stock levels”, “item availability”, “inventory accuracy”</p> <p>Shopping Experience Quality: “shopping experience”, “customer experience enhancement”, “in-store efficiency”</p> <p>Navigation and Usability Issues: “navigation problems”, “usability issues”, “app navigation”</p> <p>Checkout and Payment Process: “checkout process”, “digital coupons”, “payment method”</p> <p>Digital Integration and Updates: “app updates”, “digital integration”, “app improvement”</p> <p>Environmental and Contextual Adaptability: “environmental adaptability”, “contextual adaptability”, “store environment”</p> <p>Engagement and Usage Barriers: “engagement barriers”, “usage barriers”, “barriers to use”</p>	<ol style="list-style-type: none"> 1. Apathy 2. Excitement and risks 3. Gratification and capricious 4. Utility and hinderance 5. Absorption 6. Abandonment

Source: ChatGPT supported/developed table.

understanding, and appreciation of the research approach is important when selecting quotations ([Eldh et al., 2020](#)). [Oliver et al., 2005](#); [Duranti, 2006](#)). This is why ChatGPT was prompted/trained on the selected theories of the research, the research gap, research questions and aim of the research. Additionally, ChatGPT was provided with background information on the research, including the number of selected organizations, the type of industry, and the nature of the data. [Table 1](#) outlines the ChatGPT prompts used to acclimate it to the research, along with ChatGPT's responses, including the quotes selected.

Once the AI is familiar with the research context and data, the next step is to upload all of the transcripts and identify the research aim, objectives and research questions. It is also necessary to briefly provide the theoretical and philosophical underpinning of the research. Importantly, the researcher must ensure that the AI is fully trained on the research context and systematic thematic analytical process which must be performed. The researcher should ask the AI to summarize the systematic thematic analytical process introduced by [Naeem et al. \(2023\)](#) before providing the prompts presented in [Table 1](#). Once the researcher provides this information to the

Table 4. Fourth Step – ChatGPT Prompt, and Themes Selected by Human and ChatGPT

ChatGPT prompt to perform fourth step	Rationale of prompt	ChatGPT-generated themes based on selection of codes	Themes manually selected by Naeem et al. (2024a)
<p>Theming is a process of clustering codes based on their relationship to one another, in that they either fully or partially answer the research question. Given a set of codes and keywords, please suggest appropriate themes to answer the following research question and achieve research aim. Your theme development should be guided by the 4 Rs framework of theming—Reciprocal (connect the codes together in a meaningful unique), Recognizable (reflect the actual data), Responsive (responsive to the research question and aim), Resourceful (rich to tell the story of the research).</p> <p>Make sure the themes are based on the following keywords and codes, and they helpfully answer the research question and aim.</p> <p>The proposed themes should be different from each other yet interconnected to answer the research aim.</p> <p>All suggested themes together need to reflect the data appropriately, in terms of theoretical and conceptual adequacy, and comprehensiveness in achieving the research aim.</p> <p>Use this information to create themes in your mind.</p> <ul style="list-style-type: none"> • Coded data segments: [Insert the coded data segments or any other collected data] • Identified keywords and codes: [paste the list of identified keywords and codes from the previous steps here]. • Research objective and question: [paste the research objective and questions here]> • Theoretical underpinning: [paste the theoretical underpinning here] (ChatGPT aided /developed prompt) (ChatGPT supported/developed prompt) 	<p>Theming is the act of clustering codes based on their relatedness to each other, to answer research question(s), holistically or partially (Naeem et al., 2023; 2024b).</p> <p>Themes need to be based within the theoretical and philosophical foundation of the research and must closely link to the context of the research to develop answers to the research questions (Bulmer, 1979; Coffey & Atkinson, 1996; DeSantis & Ugarriza, 2000).</p> <p>Consideration of the 4 Rs of theming: Reciprocal, Recognizable, Responsive and Resourceful (Naeem et al., 2023).</p>	<p>1. Digital Shopping Experience Enhancement Relevant codes: user interface satisfaction, difficult app for shopping, shopping experience quality, checkout and payment process, digital integration and updates.</p> <p>2. Operational and Technical Efficiency Relevant codes: technical frustrations, app functional reliability, inventory management concerns, navigation and usability issues.</p> <p>3. Customer Engagement and Loyalty Relevant codes: customer service appreciation, feedback and suggestion, membership and loyalty.</p> <p>4. Accessibility and Inclusive Shopping Relevant codes: accessibility and inclusion, environmental and contextual adaptability, engagement and usage barriers.</p>	<p>1. Expectation and perception.</p> <p>2. Experience and existence.</p> <p>3. Affordance dichotomy.</p>

Source: ChatGPT supported/developed table.

Thank you for detailing your research scope and objectives. Let's proceed with the thematic analysis based on the Naeem et al., 2023 process you've outlined. This systematic approach will help us rigorously analyze your qualitative data gathered from app reviews, semi-structured interviews, and group discussions.

Step 1: Transcription, Familiarization With the Data, and Selection of Quotations

- **Objective:** Gain a thorough understanding of the data to identify significant statements or quotations that reflect the diverse perspectives regarding the user experience with scan and go apps.
- **Action:** I will read through the excerpts from the app reviews you provided to select meaningful quotations that seem particularly relevant to your research objectives. This will involve identifying specific issues or praise related to the affordance flow of scan and go technology.

Step 2: Selection of Keywords

- **Objective:** Select keywords that capture critical aspects of the data, serving as foundational elements for subsequent coding.
- **Action:** From the data, I'll identify keywords that reflect the realness, richness, repetition, rationale, repartee, and regal aspects of the content, focusing on how users describe their interaction with the technology.

Step 3: Coding

- **Objective:** Systematize the data into manageable units by assigning codes that summarize and categorize data segments.
- **Action:** Assign preliminary codes to the selected quotations, focusing on capturing the essence of user experiences and interactions with scan and go apps. This step will involve developing codes that are robust, reflective, resplendent, relevant, radical, and righteous.

Step 4: Theme Development

- **Objective:** Organize the preliminary codes into comprehensive themes that encapsulate significant patterns across the data.
- **Action:** Group codes into potential themes that directly relate to how the affordances of scan and go technology influence user flow experiences and navigate between enablers and constraints.

Step 5: Conceptualization Through Interpretation of Keywords, Codes, and Themes

- **Objective:** Construct a detailed narrative or framework that connects the identified themes back to the research questions, using keywords and codes to support the synthesis.
- **Action:** Use the established themes, supported by the selected keywords and codes, to create a coherent narrative that addresses the research question and objectives, further refining these themes to ensure clarity and relevance.

Step 6: Development of Conceptual Model

- **Objective:** Develop a conceptual model that encapsulates the thematic findings and provides theoretical contributions to understanding user-technology interaction.
- **Action:** Construct a model using the refined themes, illustrating how the interaction with scan and go technology flows from perception through to actualization, and how this influences the user experience and behavior.

Figure 3. Confirmation of AI Familiarization With Systematic Thematic Analysis Framework (Source: ChatGPT (AI) Response).

Table 5. Fifth Step – ChatGPT Prompt, and Concepts Selected by Humans and ChatGPT

ChatGPT prompt to perform fifth step	Rationale of prompt	ChatGPT-developed concepts	Concepts manually selected by Naeem et al. (2024a)
<p>In the conceptualization step we aim to develop concepts based on our interpretation of themes, keywords and codes. The concepts should link with theory in the context of this research. Concepts should help answer the research questions. Please define each concept. The definitions should adhere to the principles of clarity, and cohere with the theoretical and philosophical context of this research.</p> <p>To guide this process, please consider the following.</p> <ul style="list-style-type: none"> • Research question: [Insert the specific research question] • Theoretical underpinnings: [Detail the major factors of the theory] • Themes: [Insert themes from previous step] <p>Identified keywords and codes: [List the identified keywords and codes from previous steps] (ChatGPT supported/developed prompt)</p>	<p>Development of concepts in relation to the data and theoretical underpinning (Babbie, 2016; Byrne, 2015; Kerlinger & Lee, 2000; Naeem et al., 2023, 2024b).</p>	<ul style="list-style-type: none"> • Digital Shopping Experience Enhancement • Operational and Technical Efficiency • Customer Engagement and Loyalty • Accessibility and Inclusive Shopping • Seamless Interaction • Ecosystem • Engaged Community • Inclusive Shopping • Adaptive Affordance • User experience 	<p>The conceptual framework by Naeem et al. (2024a) outlined the Affordances Flow Funnel, which has the following stages: Perceived Affordances, Actualization Affordances, Affordance Dichotomy</p>

Source: ChatGPT supported/developed table.

AI, it is necessary to ensure that the AI understands the research context, and the systematic thematic analysis process. In case of any discrepancies or inappropriate responses, researchers can upload the following Figure 3 as an example of the familiarization stage for the AI.

Step 2: Selection of Keywords

The second step of systematic thematic analysis is the selection of keywords, that is, the selection of meaningful words or phrases from the transcript that capture participants' rich experiences and insights to answer the research question (Naeem et al., 2023, 2024b). Keywords encapsulate the central and meaningful ideas expressed by participants (Naeem et al., 2023, 2024b). The 6 Rs framework—Realness (reflecting the genuine experience of participants), Richness (meaningful, strong, powerful, and relevant to the research question), Repetition (same word repeated or different words with the same meaning used by participants), Rationale (strong reason or logic), Repartee (linked to the context of the study), and Regal (crucial or important to understanding)—guides researchers in selecting impactful keywords. (Naeem et al., 2023).

The selection of keywords plays a vital role in the development of codes and uses the full potential of the transcript rather than only the selected quotations (Naeem et al., 2024b). In addition, keywords are used to interpret the data (Naeem

et al., 2024b), which has several advantages, including expanding current theory (Flick, 2014; Saldaña, 2013) and using participants' own words to keep the analysis grounded in real data (Corbin & Strauss, 2008, 2015; Creswell & Poth, 2018; Morse, 2015; Richards, 2015; Ryan & Bernard, 2000). Table 2 shows the ChatGPT prompt used to ask the AI to select keywords for systematic thematic analysis, along with the justification for the prompt, the keywords generated by ChatGPT, and the keywords manually selected by Naeem et al. (2024a).

Table 2 shows that the large number of keywords identified by the AI reflects its capacity to process large datasets comprehensively, enabling it to identify a broader and more diverse range of relevant keywords. Consequently, different words relating to the same issue, or the same words on different issues can capture a broader range of expressions and nuances than manually selected keywords typically allow. This AI capability, compared to human capabilities, emphasizes how the breadth of AI can complement the depth of manually selected keywords. Table 2 presents a comparative analysis of keywords selected by ChatGPT, and those manually selected in Naeem et al.'s (2024a) study. It is evident that the AI's keyword selection encompasses a greater number of keywords, and a more comprehensive reflection of participant views, capturing both functional, customer experience and experiential aspects of using shopping apps. For instance,

Table 6. Sixth Step – ChatGPT Prompt and Justification of Prompt

ChatGPT prompt to perform sixth step	Justification of prompt
<p>To the last step in the structured thematic analysis process described by Naeem et al. (2023), your goal is to synthesize the research findings into a conceptual model. Link these concepts with a figure or diagram that proposes a feasible solution to the following research problem we want to address. The conceptual model must also contribute to managerial practices and following theory. The proposed conceptual model should answer the following questions additionally you need to keep in mind what are the key concepts of exiting theory and what are the new concept developed through this research? How are the newly developed concepts and the already existing theory? What makes these concepts closely related in the context of this research?</p> <p>As you formulate the conceptual framework, consider the following.</p> <ul style="list-style-type: none"> • Research question and objectives: [Insert the specific research question and objectives of the research] • Theoretical underpinnings: [Detail the theoretical frameworks or underpinnings that guide the study] • Identified keywords, codes and themes: [List the keywords, codes, and themes identified in previous steps] • Philosophical underpinnings: [Include an explanation of the epistemology –you can copy and paste the methodology section of your research] • Theoretical framework: Theoretical Framework: [Explain theoretical frameworks used to guide the research] <p>The conceptual model must build a story that explains why the findings are meaningful and how they work together to answer the research question. *This content is tailored from OpenAI (ChatGPT supported/developed prompt)</p>	<p>The conceptual model should be theoretically and philosophically grounded and evidenced based on actual data (Naeem et al., 2023). These insights derived from a conceptual model should lead to both theoretical and practical understanding of the research problem, which, in turn, help guide decisions (Corley & Gioia, 2011; Smith et al., 2009; Whetten, 1989; Whetten 1989, 1989).</p> <p>A good conceptual model should explain the how, why and what questions (Wertz et al., 2011)</p>

Source: ChatGPT supported/developed table.

ChatGPT includes terms like “Technical issues,” “Digital coupons,” “Technical issues,” “ExpressPay,” “Location detection,” “Pickup,” “Navigation problems,” “Screen brightness” and “Search functionality” which highlight specific features to understand the research issues in more detail. Therefore, the richness of the keywords, in terms of addressing different issues and using varied words for the same technological problem, can enhance the rigor of the research compared to manually selected keywords. For example, in contrast to the manually selected keywords related to technological issues, such as “Garbage app,” “not working,” “looking to increase buying,” “data could be lost,” “information/could not find,” and “doesn’t sync in real time,” which are less rigorous, the keywords selected by ChatGPT offer a broader and more comprehensive range.

While there is some diversity in the manually selected keywords to understand other perspectives, such as “not my job,” “job-eating app,” and “extra burden,” these primarily focus on the subjective drawbacks perceived and experienced by users, reflecting their reluctance to use the apps. In contrast, the broader selection of keywords by the AI, which includes terms like “Reliability issues” and “App review request,” allows for a more meaningful and rich

thematic analysis that can uncover the various usability aspects of the apps, potentially leading to richer insights. For example, the AI-based keywords, such as “Digital coupons” and “Savings,” touch on the societal implications of using scan-and-go apps, providing insights into the economic behaviors linked to the technological issues of the apps. Therefore, researchers can compare both the manually selected keywords and the AI-generated keywords to repeat the different rounds in order to explore the problem from a range of angles. For example, in the case of the selected case study, technological, social, and shopping experience angles can be further explored through findings that include richer words or phrases aligned with these angles, based on the 6 Rs ([Naeem et al., 2023](#)). This ensures the robustness and relevance of the keywords related to the research problem. Consequently, this capability highlights AI’s potential to strengthen the traditional keyword selection process. Such extensive keyword identification introduces new dimensions at the coding stage, enhancing the richness of codes and allowing for the exploration of the problem through different angles. This will be covered in the next section, which addresses how a larger number of keywords provides more opportunities to strengthen

existing codes and generate new ones, ultimately improving the richness of the study.

Step 3: Coding

Coding is the systematic process (Saldaña, 2013) of labelling related data different segments with short phrases or words that lend conceptual meaning to the data (Naeem et al., 2023). Boyatzis (1998, p., 63) state that a code is the “most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon”. Codes should be developed to present the combined meanings of related quotations and selected keywords; they act as the conceptual backbone of the analysis (Naeem et al., 2023). Codes unearth patterns and relationships between keywords (Naeem et al., 2023). They enable flexibility and evolution in research in response to new conceptual insights to answer research questions (Saldaña, 2013). Inductive, deductive or abductive reasoning can be used to develop codes. Deductive reasoning makes an inference based on facts or theories. Inductive reasoning makes an inference based on the observation of patterns emerging from the data. Abductive reasoning generates a hypothesis to explain observations about emerging patterns that align with theory (Attride-Stirling, 2001; Braun & Clarke, 2006; Creswell & Poth, 2018; Elo & Kyngäs, 2008; Tavory & Timmermans, 2014; Thomas, 2006).

The coding process places emphasis on creating robust, reflective, resplendent, relevant, radical and righteous codes, which is known as the 6 Rs of coding (Naeem et al., 2023). Moreover, Naeem et al. (2023) stated that researchers need to consider the grouping of keywords to make them more meaningful in the analysis. Table 3 shows the coding guidelines given to ChatGPT along with a justification of the guidelines. It also identifies the codes generated by ChatGPT and the codes manually selected by Naeem et al. (2024a). ChatGPT suggests 16 codes, whereas Naeem et al. (2024a) only developed six codes. This outcome shows that ChatGPT can enhance the use of all potential data. Their can therefore be argued that manual codes are more theoretical than ChatGPT codes. Indeed, ChatGPT was instructed to take an abductive approach, which led to the codes being based on common patterns in the data. ChatGPT can be instructed to take either an inductive or deductive approach to the development of codes. The ChatGPT prompts to identify codes from the data are shown in Table 3 below.

Table 3 provides a comparison between manual coding and AI-generated coding. As evident, Naeem et al. (2024a) identified 6 codes, while AI-generated coding produced 16 codes from the data. Therefore, two advantages emerge for researchers, as the AI-developed codes are much richer than the manually generated ones. The second benefit of more and richer keywords selected by the AI means that more codes (16 in this case) can be developed providing a rich understanding of the research problem. AI codes like “Technical Frustrations” and “App Functional Reliability” with support the

keywords provide valuable insights into the specific technical challenges users encounter during their shopping experiences. These challenges are associated with the frustration users may feel using app, and the subsequent abandonment of the app. The AI also generated more customer shopping experience-related codes, such as *Shopping Convenience*, *In-store Pickup*, *Warehouse Deals*, and *Inventory Management Concerns*, which highlight operational efficiencies within the organization, including stock levels and product availability. . These advanced codes make it possible to study the challenges customers experience which are more related to organization support and infrastructure. The above analysis of the depth of keywords used to develop 16 codes provides sufficient evidence to suggest that AI can add value in terms of the robustness and richness of coding. AI can enhance the richness of codes either by supporting them with additional keywords or by generating further codes that address other aspects of the research problem.

Step 4: Theme Development

Theme development is about clustering codes into different categories according to their relevance in the context of the research question. Consequently, theming is about structuring the data to form a meaningful conceptual narrative to achieve the research aim (Naeem et al., 2023, 2024b). Yet these themes need to be grounded, with real data, participant language (Naeem et al., 2023), and the theoretical and philosophical underpinnings of the research (Coffey & Atkinson, 1996; DeSantis & Ugarriza, 2000). Thus, themes are a way of deriving meaning from tied codes (Charmaz, 2006; DeSantis & Ugarriza, 2000) to develop a conceptual framework. Naeem et al., (2023) continued to propose that themes need to follow the 4 Rs of theming. They must be: Reciprocal (joining the codes in meaningful form); Recognizable (from the real data so they can be identifiable); Responsive (to the research question, as well as its aim); and Resourceful (rich enough to be coherent as a research story). This ensures a multidimensional connection between real data, the research aim and objectives, the methodological underpinning and the theoretical underpinnings of research (Naeem et al., 2023). Based on these guidelines, a ChatGPT prompt (see Table 4) was used to ask ChatGPT to generate potential themes.

The following prompt was developed and generated by ChatGPT, based on the perspectives of various authors. This prompt was used to ask ChatGPT to suggest theme names based on the keywords and codes identified in the earlier stages of analysis. The themes generated by ChatGPT are presented in Table 4 and compared with both the AI-generated themes and those manually selected by Naeem et al. (2024a).

As above table illustrates, the implementation of AI-developed themes has largely broadened and deepened the themes themselves as compared to those that were developed manually. This also illustrates how the theme of *Customer Engagement and Loyalty*, as discussed throughout the AI

analysis, aligns with the *Affordance Dichotomy* theme identified by Naeem et al. (2024a), contributing to the existing body of knowledge on gaining value from customers through appreciation and obtaining feedback that organisations can leverage further. The AI-generated themes such as “Accessibility and Inclusive Shopping.” do not explicitly appear in Naeem et al., (2024a). Thus, the themes derived manually did not account for environmental adaptability and contextual impediments, and as a result, these aspects were not identified. Furthermore, manual themes excluded certain technological features. AI suggested precise and granular themes, such as *Digital Shopping Experience* and *Operational Technical Efficiency*, which reflect action-oriented and system-focused features, highlighting specific technology-related user perspectives. Therefore, the diverse range of AI-generated codes should be considered to enhance the breadth of manual codes and may contribute to the development of more significant themes that enrich the study.

Step 5: Conceptualization

The fifth step, conceptualization, involves creating a link between theory and the developed themes through interpreting keywords and codes for conceptual clarification (Naeem et al., 2023). Concepts are generalized ideas that represent specific phenomena or objects (Kerlinger & Lee, 2000). Conceptualization plays a crucial role in theoretical development by categorizing data into meaningful forms through linking themes with the context of the research (Naeem et al., 2023). The interpretation of themes can be authenticated by using participants’ language, which enables systematic investigation (Babbie, 2016; Byrne, 2015; Naeem et al., 2023, 2024a). In the case of deductive reasoning, the research needs to focus on concepts that are underpinned by theory, while inductive reasoning can reinforce the concepts through the use of the participants’ language (Babbie, 2016; Byrne, 2015).

Naeem et al. (2023) provided guidelines in the form of questions to evaluate conceptual definitions: Are the definitions clear and explicit in a theoretical context? Do the new concepts enhance understanding of the research findings? Are they theoretically and philosophically accurate, and are they traceable from the primary data? Do they reflect the actual data? Are the concepts grounded philosophically, analytically and theoretically? Are they appropriate to justify the research outcomes in relation to theory and practice? Are the concepts theoretically interconnected with the development of a conceptual model?

These guidelines were used to develop a ChatGPT prompt to ask for AI assistance with the conceptualization of themes. Table 5 shows that the concepts developed by ChatGPT are based on the participants’ experiences, whereas the manually derived concepts are more related to the theoretical underpinnings. Researchers could amend the prompt and ask ChatGPT to develop theory-related concepts that link themes

together and answer the research question. A ChatGPT prompt (see Table 5) based on these guidelines was developed to ask ChatGPT to suggest concepts.

Table 5 shows the differences or similarities between AI-generated, and manually developed concepts. AI based notions like “Digital Shopping Experience,” “Operational and Technical Efficiency” and “Customer Engagement and Loyalty” formulated much wider and comprehensive explanation than the manual conceptualization that was developed manually by Naeem et al. (2024a). Additionally, AI-generated ideas, like “Ecosystem” and “Engaged Shopping Community,” might add more theoretical concepts to the notion of affordance, extending some communal and environmental aspects of the shopping experience. Each of these concepts generated by the AI is seemingly a rich amalgamation of the codes and themes already discovered, showing that the codes and themes are embedded within the data, as well as the methodological, philosophical and theoretical foundations of the research. It is evident that the ideas generated by AI are rich in detail and offer deeper analysis of the affordances of apps, particularly in relation to seamless user experience and operational efficiency. These could expand the boundaries of the conceptual framework. This is an indication that though AI and manual analyses are not the same, a combination of both represents a better result. However, if the researcher instructs AI to align the main themes and codes with existing theories and models, this can be achieved by guiding ChatGPT to develop concepts in line with those frameworks. Thus, the use of AI can significantly enhance the conceptual foundation, both by correlating with established models and by introducing new aspects and finer levels of nuance.

Step 6: Development of the Conceptual Framework

The last stage of systematic thematic analysis is to produce a conceptual model/framework that brings together the identified concepts with each other. These links should connect with the data as well as with the existing literature and theoretical basis for the research (Naeem et al., 2023) to offer a solution to the selected problem. Therefore, a conceptual model should be constructed by combining the thematic synthesis of codes and keywords alongside theoretical and philosophical discussions of the research (Naeem et al., 2023). The conceptual model/framework justifies findings through the development and linkage of new concepts (Lewis, 1998). This includes storytelling and process (Naeem et al., 2023), providing a figurative, conceptual, and narrative description of the properties and dimensions of the identified codes and themes, as they relate to a selected theoretical or practical solution for the research problem. Therefore, the conceptual framework must offer clear and intuitive guidance for practitioners, assisting them in complex, applied decision-making (Corley & Gioia, 2011; Hamilton et al., 2023; Smith et al., 2009; Whetten, 1989). Thus, the framework should incorporate a process that professionals can follow to transfer research into practice. The

concepts in the conceptual model need to connect with existing theoretical concepts and the study's theoretical rationale should be noted (Reay & Whetten, 2011; Wertz et al., 2011) to connect newly developed concepts with existing theoretical concepts (Naeem et al., 2023; Rynes, 2002). While in general, the merit of theory is measured by its contribution to knowledge (Chun Tie et al., 2019; Thurlow, 2020), "The route to good theory leads not through gaps in the literature but through an engagement with problems in the world" (Kilduff, 2006, p. 252). Moreover, the principle of good theory involves identifying what relates to what (What), understanding the interconnectivity between these concepts (How), explaining why (linking rationales) (Why), and finding the balance between comprehensiveness and parsimony when solving a specific problem (Dubin, 1978). Therefore, Naeem et al. (2023) suggest that the conceptual framework should define and address the selected research problem. A prompt for ChatGPT was developed based on the viewpoints of the above authors, requesting ChatGPT to provide explanations of the concepts to be connected in a diagram format, along with advice on a conceptual model that would explain these concepts. The proposed conceptual model, based on instructions given to ChatGPT, and ChatGPT's suggested conceptual model, can be adjusted or adapted by researchers. Table 6 shows the ChatGPT prompt used to request the AI to establish a conceptual model that synthesizes the findings from the research, along with the justification for the prompt.

Integrating AI in Thematic Analysis: Dealing with Bias and Navigating Challenges

This paper describes a toolkit (ChatGPT prompts) for systematic thematic analysis (Naeem et al., 2023) that uses AI. The toolkit helps researchers thematically analyse data on the basis of various methodological approaches. In general, thematic analysis is limited by aspects such as subjectivity and potential biases due to the limited ability of researchers to process large amounts of data (Morgan, 2023). However, this paper introduces a toolkit that can consider large datasets, varied research contexts, and complex theoretical, methodological and philosophical underpinnings at each stage of systematic thematic analysis (Christou, 2023a). In addition, AI-powered systematic processes could improve the consistency of thematic analysis. Turobov et al., (2024) indicated that, traditionally, thematic analysis has been criticised for its inconsistency and lack of generalizability.

Traditional thematic analysis faces other issues that could also be overcome by the use of AI-powered systematic thematic analysis. For example, researchers have highlighted that traditional thematic analysis variously: lacks a theoretical underpinning (Hamilton et al., 2023), is subject to research biases (Ngulube, 2015; Pope et al., 2000), is difficult to use when analysing large amounts of data, and is time consuming (Nowell et al., 2017). It has also been

criticised for simplifying complex issues (Vaismoradi et al., 2016) and lacking methodological consistency throughout the analytical process (Nowell et al., 2017; Vaismoradi et al., 2016). AI-powered thematic analysis of large amounts of data could be less time consuming, and AI is able to analyse complex patterns in data (Christou, 2023b; Lee & Choi, 2023). Many researchers have indicated that AI use in research is more time-efficient and reduces human bias. It also improves the efficiency and accuracy of the analysis (Christou, 2023; Lee & Choi, 2023).

The challenges in generating AI instructions, the necessity for verification of results, and acknowledgement of the bias inherent in AI-generated data underscore the need for rigorous oversight of AI usage (Zhang et al., 2023). As stated above, some of the challenges traditional thematic analysis faces can be overcome by using AI, but AI-powered thematic analysis is not without its challenges or weaknesses. For example, AI can reduce human bias in analysis, but AI algorithmic bias can undermine equity and validity (Noble, 2020), which could have an impact on research findings. The lack of visibility of AI inputs and processes, which is termed the "black box" problem, creates challenges of transparency and accountability (Greene et al., 2021) that require human intervention. In response, this paper proposes a prompt for each step of systematic thematic analysis that could reduce human bias while, at the same time, improving transparency and accountability. Indeed, accountability is provided by the rationale for each of the prompts during the analysis process. Another issue with using AI in research is researcher influence; that is, the instructions given to an AI system by a researcher (Christou, 2024), and lack of reliability and accuracy (Christou, 2023b). Some traditional methods can be applied to deal with the consistency and accuracy of codes and themes, such as member-checking (Creswell, 2014; Ngulube, 2015) and repeating multiple coding rounds (Sweeney et al., 2013). In addition, this paper provides guidelines on providing the rationale behind the instructions given to AI, and sufficient information should be provided to the AI system at the first step of systematic thematic analysis (familiarization) to inform it about the research context and data.

The toolkit described in this paper not only benefits systematic thematic analysis but also enriches other qualitative research methods. For instance, the initial coding in narrative and content analysis in ethnographic research, which focuses on the identification of patterns in behaviour, can be achieved through the application of the coding guidelines outlined in this paper. Phenomenology focuses on the meanings individuals attach to their experience (Moustakas, 1994), anthropology requires understanding of the cultural setting (Geertz, 1973) and grounded theory builds theory (Charmaz, 2014; Glaser & Strauss, 1999). The toolkit espoused here can be used to identify patterns in data that could be helpful to categorize data into themes or codes, and participants' language could be used to develop codes and keywords that will facilitate interpretation of the results in many types of qualitative research.

Conclusion, Contribution and Recommendations for Future Research

The current paper introduces an AI toolkit which draws on previous research. It provides a rigorously developed AI toolkit to enhance transparency around the use of AI in research. Qualitative researchers can develop their own toolkits by considering the process set out in this paper. In addition, the paper provides guidelines on how to develop a toolkit for AI to reduce bias and improve the reliability of qualitative research. When examining the future of qualitative data analysis, two critical truths are becoming more apparent: The first is that AI must play an integral role in the process of improving the discoveries of qualitative research. The second is that although AI is a powerful tool that can boost and redress many aspects of qualitative data analysis, it makes us more aware of the different ways in which problems can originate in our desire to produce enhanced, ethical and insightful results.

This paper represents a pioneering attempt to integrate an AI, specifically ChatGPT, into the systematic thematic analysis process introduced by Naeem et al. (2023). This toolkit entwines AI with each of the six steps of thematic analysis, adding to the richness, robustness and efficiency of thematic analysis. Importantly, the typologies of ChatGPT prompts developed through consideration of different authors can enhance the performance of AI-powered analysis with implications for the quality of research. AI can analyse extensive sets of data, helping recognise patterns, keywords, and themes that would otherwise be missed or take an inordinate amount of time to uncover. As such, AI adds a new depth of analysis to large data sets through consideration of the methodological and theoretical underpinning of the study. This supports the idea that AI can supplement and enhance traditional thematic analysis processes and could be helpful to introduce a theory or conceptual model that is richer, and far more nuanced than traditional/ human based thematic analysis. However, this does not mean that AI alone can perform the thematic analysis. The researcher needs to be fully involved in the process, repeating any stages of the analysis and providing additional details to AI to achieve the research aim. AI should be trained about the research and the thematic analysis process, as demonstrated in Figures 1 and 2 above. Once the researcher receives consistent responses and AI becomes familiar with the research and systematic thematic analysis, the researcher can begin to perform the analysis.

For the sake of transparency, the authors would like to acknowledge the use of ChatGPT was employed to enhance clarity of language, improving understanding and sentence structure. Nonetheless, the authors have gone through the entire manuscript and take absolute responsibility for the information presented. The paper also provides recommendations on how researchers can mitigate these limitations using different traditional strategies. The scope of this paper is limited to the use of AI for systematic thematic analysis. Future researchers could extend the scope to other

qualitative research methods by exploring research questions such as:

1. How can AI be used to ensure data saturation in systematic thematic analysis to extract more insights from source data?
2. How can AI be used to improve the authenticity, rigour, reliability, trustworthiness, transparency and accountability of qualitative research in thematic analysis?
3. How can the process of reflexivity be applied to reflect on AI-based systematic thematic analysis? What are the major factors and steps that should be considered when using AI in systematic thematic analysis to improve the transparency of research?
4. How can AI be used to develop case study as foundation of systematic thematic analysis in the qualitative research?
5. How can AI-based systematic thematic analysis support ethnography, phenomenology, anthropology, grounded theory, and action and narrative research?
6. How can researchers enhance cognitive input into generative AI to improve the quality of analysis in qualitative research?

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