A Design Framework for Novice Using Grounded Theory Methodology and Coding in Qualitative Research: Organisational Absorptive Capacity and Knowledge Management

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Abstract
Grounded theory methodology (GTM) is an extensive research methodology that is immensely active in numerous social science research fields. It is by far one of the most popular techniques applied in qualitative research. The challenge in using such methods might appear in their complexity. Several steps of coding and analysis in GTM can be fuzzy and multifaceted for novice researchers specialised in Information Systems (IS) fields, knowledge management, and broad applications of IS. The current study suggests a design framework for novices in qualitative research that presents GTM as a set of techniques characterised graphically, allowing the extraction of grounded results and a set of pragmatic analysed data classifications rather than only concentrating on implementing a grounded “theory”. Hence, the research stresses using the term “grounded techniques”, permitting the creation of grounded categories to strengthen qualitative research results’ rigour. The proposed framework meticulously exemplifies how an organised set of phases in a research design can enlighten the novice researcher while conducting a study in knowledge absorptive capacity using a comprehensive GTM process to enforce the understanding of GTM techniques.

Keywords
absorptive capacity, coding, grounded theory methodology, axial coding, open coding

Introduction
The research facets illustrated in this research are an extended version of a study by Al-Eisawi and Serrano (2019). The previous study offered an abstracted lookout illuminating the notion of Absorptive Capacity (ACAP); that is the ability of a firm to integrate, transform, and apply valuable knowledge required for business success (Caiazza et al., 2021Caiazza, Phan, Lehmann, & Etzkowitz, 2021a, 2021b). Additionally, the current study is a more detailed version that profoundly tackles a case example of ACAP contained by the field of IS and aiming to illustrate a comprehensive systematic approach to applying GTM. Later, a bias reduction process was implemented to validate the resulting categories extracted from using GTM. The research presented a design framework for the exploration of organisational ACAP. The exploration relied on the use of Grounded theory methodology. Wiesche et al., 2017

This study came to broadly scrutinize key phases of GTM and display how they are undertaken exhaustively. The practical case example provided an inclusive skeleton that utilizes GTM analysis and techniques on a research aspect

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within the IS field knowledge Absorptive Capacity (ACAP). Absorptive Capacity (ACAP) ACAP is proposed to play a significant role in enriching the process of knowledge creation embraced inside contemporary organisational hierarchies (Zahra & George, 2002).

The proposed design aims to deliver a foundational framework demonstrating the interplay between the methods and processes inherent in a GTM study, as presented the upcoming sections of the paper.

**Background Review**

*Grounded Theory Methodology*

Grounded Theory Methodology (GTM) aims to be inductive, the researcher does not normally start with a hypothesis (Charmaz, 2005), however, the aim is to discover the hypothesis through the analysis process, and the impression is to discover theory (Strauss and Corbin, 1990). It is not essentially a kind of method, in most research it is rather a way of analysing data that focuses on discovering things, and uncovering ideas (Strauss and Corbin, 1990). Grounded theory was defined by Charmaz (2006) as a method of conducting qualitative research that focuses on creating conceptual frameworks or theories through building inductive analysis from the data (p. 187). Still, Birks, Cant, et al. (2013), defined GTM as mainly a process for theory extraction produced by data analysis. Theory is not revealed; rather, theory is built by the researcher who sights the world via their own certain lens (Caiazzia et al., 2021a, 2021b). There are numerous customs of undertaking GTM, reflecting various lookouts and opinions of the originators and scholars (Amorim et al., 2021). Nevertheless, it cannot be straightforward for new researchers to consider GTM as a technique and choose the best implementation tactic to follow. Many of the available qualitative research studies have been criticized concerning their validity and complexity in terms of unstructured nature, and subjective contribution (Turner and Astin, 2021). The goal at this point is to present the process of the qualitative data analysis and results undertaken thoroughly from a systematic GTM approach. The research example explored in the current study is required to be an imprecise type of organizational control that requires further investigation. The grounded theory approach in the current research was used to guide the research questions extraction for the final stage of the research model building (Al-Eisawi et al., 2020). However, theory extraction was not the main aim of the analysis. Thus, the objective was to extract categories that may serve as categories for determining the research dilemma. The research question was explored using prior literature review without any settings for research hypotheses. However, the phenomenon of ACAP was still unclear until analysed openly using GTM (Al-Eisawi and Serrano 2019). The current study was significantly influenced by Corbin and Strauss (1990) school of GTM, as the two scholars believe that researchers can use GTM for building a systematic understanding of a certain phenomenon, and not essentially to extract a theory. There is an apparent interaction when following GTM between data collection and data analysis as both are initiated synchronously (Bryant, 2002). Figure 1 below illustrates GTM core process elements and distinctive features:

Also, GTM core elements in the following are presented to explain elements of Figure (1) and stating the distinctive features of the grounded theory (Gibbs, 2018).

1) **Inquiry Shaped:** refers to social areas that can be applied in different allied fields, and it can be used in variety of research subjects.
2) **Simultaneous Process:** data collection and data analysis are produced simultaneously: a combination of analysis and collection process, so the analysis process can start before the researcher is complete with the collection process with an initial part of collected data. (Service, 2008).
3) **Inductive approach:** in GTM researcher does not normally start with a hypothesis (Charmaz, 2000). However, the aim is to discover them through the analysis process.
4) **Theoretical Sampling:** refining and elaborating categories that will be discovered as the researcher goes through the analysis; theoretical sampling is a sampling that can be done alongside the analysis process (Gibbs, 2018).
5) **Progressive Move:** the progressive move from a very descriptive coding to a more analytical coding of data, so towards the end of the research the aim will be to reach a more abstracted theoretical understanding of the phenomenon being investigated.

**Absorptive Capacity**

As defined in the previous section that Absorptive Capacity (ACAP) is the ability of a firm to integrate, transform, and apply valuable knowledge required for business success.
ACAP is proposed to play a significant role in enriching the process of knowledge creation embraced inside contemporary organizational Information Systems (IS) environments. Many misperceptions surround how ACAP can be measured and understood as an organizational construct. The aim of this research is to present the exploration of ACAP using GTM techniques and decrease such misperception by providing qualitative measures for ACAP dimensions, these dimensions are categorised systematically following a rigorous GTM approach, and as thoroughly explored in sections 4.1, 4.2, 4.3, and 4.5.

**Proposed Design Framework**

As mentioned earlier that one of the research purposes is to build the proposed systematic pragmatic research design shown in Figure 2. Accordingly, the design reflected the aim of the whole study. The key foremost purpose was to build a design framework that presents the systematic phases of GTM dedicated for qualitative researchers (Al-Eisawi, 2019), later key phases in the design are explained explicitly to assist new and unexperienced researchers to better implement a GTM approach. The pragmatic design also indicated the clear steps needed to be followed including the initiation point starting with research questions, analysis, the coding stages, ending with validation and bias reduction. The proposed pragmatic research design assisted as being a leading instrument used throughout the whole research and was later used to evaluate how the research resolutions are being accomplished. The current research intended to deliver a precise representation of an organisational field, and creating a systematic understanding based on the exploration of proposed relation through semi-structured interviews.

**Methods**

The research was conducted using GTM coding and analysis techniques aiming to provide qualitative measures for organisational absorptive capacity dimensions, and extracted using semi-structured interviews, later analysed using GTM coding techniques (Al-Eisawi and Serrano 2019). However, all the approaching sections within the current research will identify mentioned steps and phases in the proposed design framework. The study explored GTM as a comprehensive research methodology and presented as set of multi-research methods in one. The method was engaged in the application of different technique such as simultaneous data collection, constant comparison, memo writing, and coding until reaching theoretical saturation as explained in detail within section (4). All these techniques created a consciousness of the scientific significance necessary for any grounded theory research. Furthermore, the implementation of GTM promoted the features of the current research facets (Charmaz & Bryant, 2011). Drawing on the analysis, the research proposed a relational model that includes categories that can be used in the literature and treated as guides to IS researchers and senior managers in exploring the rich facets of ACAP as presented later in Figure 10.

**Data Collection**

Data was collected from (22) semi-structured interviews conducted with senior managers working in two telecommunication companies and analysed following GTM coding techniques (Al-Eisawi and Serrano 2019). As shown in the design framework Figure 2 that step (1) initiated with a research question, the research question was explored using prior literature review without any settings for research hypotheses. However, the phenomenon of ACAP was still unclear until explored openly using GTM. Accordingly, the goal was to answer the below research question:

“What are the categories that determine organizational ACAP dimension, and that can support potential creation of knowledge?”.
Analysis (Coding)

Data analysis relied largely on two data coding techniques guided by GTM: open and axial coding, then the selective or theory creation which was not a major intention. A code in GTM is a specific indication of the main issue or phenomenon that is going on in the text or in the collected data (Gibbs, 2018). The empirical design shown in Figure 2 demonstrates that there is an apparent interaction in GTM between data collection and data analysis as they both initiate synchronously (Bryant, 2002).

Qualitative Data Analysis Using GTM Coding. Qualitative coding references a process of reducing the data without changing the meaning and having an incredibly open mind while looking at the data (Service, 2008), starting with a large amount of data ending with small abstraction view. Reducing the size can be performed by assigning a phrase to represent a certain aspect of data, and the act of labelling this data, the essence is to reduce the amount of data and capturing valuable information.

Figure 3 above illustrated major coding outcomes in GTM phases. Consequently, coding in the current research aimed preliminary at reducing the amount of data, the coding technique was conducted following Glaser (1978), and Strauss and Corbin (1994) analytical approach. Next, configurations of categories in which will enable the researcher to gain a deeper understanding of core detailed divisions of data. Next, the categories were assigned to relevant themes, finally main themes were extracted to validate the understanding of categories and themes.

Analytical Coding Approach. The choice of the research to follow the analytical approach signified the pursuit of finding a method that is more likely to apply grounded theory typically for data analysis using coding. In this approach the coding followed the paradigm model in coding data with three main levels, the research initiated the coding with a stage called open coding, then axial coding, ending with selective coding process while researching the different strands of GTM, the premier amount of research uncovered that there are three levels of coding performed, very little research included only two levels of coding. (Turner and Astin, 2021). However, the three levels of coding occurred within two different main stages, initial stage of coding and developing of what so called as ‘categories’, the second stage is referred as the ‘emergent stage’, it is the stage when the theories start to emerge while explaining the extracted categories using memo writing (Walker and Myrick, 2006).

Amount and Hierarchy of Data in Coding Stages. As mentioned earlier that coding in the current research referenced a process of reducing the data without changing the meaning and having a very open mind while looking at the data, starting with a large amount in (Open Coding) shown in diagram (3), in the open coding the data is required to be relatively big in terms of amount. Later, in the Axial coding, the data starts to eliminate gradually as it is classified, so the researcher deals with themes or classification, rather than dealing with an extensive list of categories. Finally, in reaching the selective coding, the data is very abstracted into a few theories of text or storylines. (Turner and Astin, 2021). Data hierarchy model is shown in Figure 4.

Inputs and Outputs in Coding Stages

This section visualises the key inputs and outputs required in the current research for the three phases of coding. However, each phase is being explained individually in a separate section starting with section (4.4.)

Building on Figure 5, the input of open coding or initial coding as mentioned in design framework is the real text collected from participants in the interview, and the outputs are set of initial codes coded again into categories. Later, the axial coding was employed to build a relational model following Strauss and Corbin (1998) paradigm model as an output of this phase. Finally, selective coding required the paradigm model as an input to extract a final core category and document a storyline out of the main ideas of each collection of themes and categories. (Turner and Astin, 2021).

Coding Phase One: Open (Initial) Coding

Open coding refers to the key analysis process in this research; it is an unrestricted process of categories identification that is extracted from the transcribed interviews. Additionally, it is a set of techniques that engage initial labelling of all available data, and then segmenting data into chunks according to proposed classifications and themes (Glaser, 1978). The process of open coding as a process that engages categorising, classifying categories into lines of text and groups that relates to a certain pattern, and that might be predefined earlier in the literature review stages. Moreover, engaging the use of memo writing until reaching theoretical saturation was an essential part of open coding (Turner and Astin, 2021).

The output of open (Initial) coding are the extracted categories shown in the table located in the Appendix section columns (2) and (3) respectively, Classifications/Open Codes, and Codes/Initial Codes. Figure 5 also illustrates the open coding input and output. Each category was coded as a sub-node, later was rationalised into the suitable main node that is
referenced as a theme in the axial coding process. In open coding, the main input was the participant’s transcripts, and the final output was the developed categories. Open codes were extracted using Line-by-line coding process which indicates reading each line of text and labelling the text with a referencing phrase or set of phrases were required to be an important part within the open coding process. Following the method of line-by-line open coding of Strauss and Corbin (1998), lines were treated as bits of sentences. Using line-by-line coding was a way of breaking through things and forcing the researcher attention to know the main phenomenon of each line of text. The researcher(s) of the current research went for a line at a time and coded this line. Initially, by assimilating the collected filtered data into transcripts, and one unit containing (5000) words and (20) pages of text using the qualitative data analysis software NVivo. Notes from each interview were reviewed. Alongside this process, many forms of data such as notes or what is referred to as memos in grounded theory, also handwritten correspondences, and relationships all were undertaken during the coding process. As mentioned earlier, that analysis and data collection in grounded theory analytical process are both processes that can interconnect. The researcher read the transcribed interviews carefully, figures out the main ideas realising the whole idea, and apply a line-by-line
Discovering Categories

In the categorizing process, each researcher can categories the data in the transcript according to a particular assumption and interpret the text differently (Gibbs, 2018). Categorising was the act of coding the selected initial codes from phrases that were interpreted by the reader or researcher. The guideline in the current research on how to extract categories were motivated by the seminal work of Birks, Fernandez, et al. (2013), who tend to list a comprehensive and clear set of guidelines, focusing on the concepts and relations amongst categories, moreover, these relations are discovered systematically in an iterative way (Tomás et al., 2021).

Naming Categories

The terms extracted in the categories table Appendix: Extracted Codes points out to certain procedures rather than pointing to long clarifications (Packer-Muti, 2016). For example, the category name ‘well-established relations with data providers’ was selected over initial codes. The mentioned processes explain the act of involvement with any data provider. Researcher(s) of the current research looked for a term that references the act of (connecting with providers, The categories naming, and explanation of the categories conveyed to one of the following behaviours to determine the final naming.

- Option 1: Some of the categories were extracted from terms and ideas learned from literature; however, in some cases, literature terms were found somehow limited, so the researcher used broader descriptive terms identify categories (Glazer, 1990).
- Option 2: The use of a secondary researcher that provided a second opinion for the naming category (Service, 2008). This process of naming and renaming categories had also assisted in the process of bias reduction in extracted categorized.
- Option 3: Using informants’ terms, the help of NVivo automated words frequency extracted directly from the transcripts coded in the open coding process (Service, 2008).

Identifying Hierarchical Structure of Categories

In GTM, when identifying categories, they may be treated as having properties, or dimensions just like colour specifications (shade, intensity) Charmaz (2005). For example, when the current research used the phrase “Allocating financial budgets in category C6 Codes Appendix, it was assessed as follows in Table 1.

Constant Comparisons

Constant comparison in GTM coding is defined as “comparing incident against incident for similarities and difference (Ellis et al., 1992) In the current research constant comparison was undertaken by reading the interviews transcript many times by more than one researcher, to reduce any kind of preliminary bias, moreover, achieving the constant comparison process is required as a way of comparative analysis that engaged a constant comparison between each response from a single participant of the semi-structured interviews with what was collected from all previous participants until reaching an ending point of categorising. By constantly looking backwards and forwards and comparing the previously collected data with current data, documenting the relative differences and similarities using memos (Packer-Muti, 2016). The constant comparison in the current research was critical to evaluate the impact of demographics on the responses, and it was imperative for the process of extracting categories and constantly comparing new answers with extracted categories.

Memo Writing

Memos were created as written notes to get ideas and in the following key research stages (Service, 2008),

1. Throughout the interviews.
2. While transcribing the interviews.
3. While coding the data.

Memos in this research were valuable instrument during data collection and data analysis, as they were required to be a tool in drawing and tracing the process until final codes were extracted. It should be mentioned here that memos are natural tools or notes that occurred from the data itself (Chramz, 2001), in the bellow section an example explored how the software NVivo was used to assist the process of memo writing, it has a built-in tool for generating memos. The researcher initially used many codes to organise and assign empirical data logically until the coherent structure was achieved. The current research followed Glaser (1978) guidelines in documenting the memos. Generating effective memos helped in assisting the process of coding the data, extracting categories, extracting relation, and finally extracting theories. The challenge was to determine when to finish collecting data, and when to finish adding new data for the process of category extraction.

Figure 6. represents a memo example used to document notes for one of the research categories. Conversely, Charmaz (2011) suggested that memos more likely to be used as a
personal self-conversation by the researcher, and this conversation is not required to be shared publicly unless to secondary researchers working on the same research.

**Theoretical Saturation**

Theoretical saturation revealed the process of knowing when exactly to stop with collected data, and with coding the data needed for extracting new categories, seeking for variation or similarities. Data collection proceeded until reaching theoretical saturation; the new data is not adding any significance to the existing data collected from the different participant. Therefore, it is important not to start theoretical sampling too early in the data collection process (Gibbs, 2018), rather, the researcher should resume with sampling to exploit variations, and theoretical sampling should be used later in the process. A major problem faced in reaching theoretical saturation was the absence of a previous literature review that may be followed as a standardised technique in reaching theoretical saturation. Nevertheless, founders and scholars of GTM such as Charmaz (2001) suggested that reaching saturation is required to be a decision of the researcher; mentioning that theoretical saturation is an overly critical concept in GTM research and is based on a subjective decision of the researcher. For that reason, most GTM scholars suggested not starting theoretical sampling in the exceedingly early stages, as it may lead to biased theories. Likewise, they suggested waiting until a further reasonable amount of data is collected (Gibbs, 2018).

Correspondingly, this led the researcher to conduct several interviews for extracting each category until getting saturated. The process of reaching theoretical saturation was challenging as the researcher presumed it. The above diagram in Figure 7 illustrates process of theoretical saturation.

**Results from Open Coding**

The resulted number of categories appeared after conducting the process of open coding: (19) distinct categories; these were classified from a total of (57) as shown in Figure 8 below, codes also extracted from several lines and direct quotes from the lines of the transcript. The main categories included factors for assessing the organisational ACAP directed throughout the research question and interview questions (Caiazza et al., 2021a, 2021b).

**Coding Phase 2: Axial Coding**

In this phase, the most critical goal was to derive a coding paradigm or theoretical model that links categories with relational themes. After having a complete set of coded categories, and everything has been looked at from the previous transcripts.

**Axial Coding Results**

The result from axial coding is that the (19) categories were classified into (4) pre-defined themes: Acquisition,
Assimilation, Transformation, and Exploitation. Classification process was based first on evaluating the categories logically into four main classes according to (Packer-Muti, 2016) who tempted to deliver an overall evaluation of GTM. The input to the axial coding was the extracted categories; the output is building a relational model that relates each theme of ACAP into its corresponding category as illustrated in Figure 9.

In axial coding, it was looked at the conceptual categories extracted from the open coding phase. Their interdependencies were examined for outlines that might explain the

Figure 7. Process of theoretical saturation (Service, 2008).

Figure 8. Open coding result diagram (Al-Eisawi, 2019).

Figure 9. Axial coding input and output for the current study.
relationship between ACAP different dimensions. In line with the current research, the process of linking categories to fit each of the ACAP dimensions is referred to as axial coding (Strauss and Corbin, 1998). The results presented a total of (7) categories were found relevant to the dimension Acquisition, (5) categories for Assimilation, (3) categories for Transformation, and (4) categories for Exploitation. All explained in the bellow table number of categories related to each theme as an output of axial coding. It is imperative to mention here that axial coding was not grounded in extracting the selective themes. However, the purpose was to relate the grounded categories from open codes to the main dimensions of ACAP that references the model of George and Zahra (2002). A relational model was built subsequently to illustrate these relationships between each theme and its corresponding categories, as in Figure 10.

Thematically and as recommended in GTM research, the current research applied Strauss and Corbin (1994) paradigm model components that guided the axial coding model creation to create themes in axial coding. Each component of the model allowed the reflection and creation of certain them of axial coding. The process of axial coding mostly referred to the act of taking the refined core categories extracted in the open coding phase, and carefully assigning each code to a predefined theme of ACAP that was all defined and described within the early exploratory phase of literature review. Subsequently, the above presented Figure 10 represents a diagram that links each theme with its categories, and which demonstrates the final relational model for extracting the ACAP qualitative categories as a result of both open and axial coding techniques. The relational model encapsulates the (19) categories extracted in the open coding phase; later each category was referred to the corresponding ACAP theme.

Drawing on the extracted model, the proposed categories were coded according to the answering patterns established within the number of participants through an open coding process. Later, these categories were assigned to the dimensions of ACAP referenced as themes within the GTM reflection.

**Coding Phase Three: Selective Coding**

Glazer (1990) described the selective coding as systematically selecting the core category to other categories and filling in categories that need further refinement. Selective coding is the final coding phase in GTM extraction. The process of selective coding in the current research primarily involved storytelling of the main ideas extracted from undertaking open and axial coding. Likewise, input to the selective coding is the paradigm model from axial coding, and the output is storylines explaining theories derived from the given model in Figure 10. The process of selective coding went through Initially selecting one core category, which is required as a central idea around the main phenomenon., afterwards, constructing a storyline around what was selected. Strauss and Corbin (1994). In the current research, the main goal of

![Figure 10. Final grounded relational model ACAP qualitative categories. (Al-Eisawi, Serrano Koulouri, 2020).](image-url)
undertaking the grounded theory approach is to construct categories that relate to the four dimensions of ACAP; selective coding was undertaken as a step further to explain the core categories.

Results from Selective Coding (Theories)

The results indicated the extraction of four main theories proposed by the GTM scheme suggested in the Strauss and Corbin (1998) methods of extraction. However, as mentioned in the above section that extracting theories was not a primary objective in using the GTM method in the current research. Nevertheless, the main goal was to use the categories extracted in the axial and open coding phase and later deploy them in building the ACAP relational model. (Gibbs, 2018) indicated that a genuine grounded theorist should extract only one grounded theory for the whole research phenomenon. This can be an incredibly challenging procedure for the researcher to extract only one core category and draw a storyline around it. Selecting only one core category was an overly complex aspect to be undertaken in the current research due to the number of categories extracted for each theme. The proposed theories are as described as the following,

Proposed Grounded Theory (1). The first resulting theory was regarding the initial dimension of ACAP knowledge ‘acquisition’. The theory was extracted by concluding a unified category from the set of categories that fulfilled a theme in the axial coding phase. After going through the categories and mapping them to the pervious understanding of the theme ‘acquisition’ gained through both data analysis and literature review. The resulted core category was ‘collaborative data interchange and research support.’

Core Category: collaborative data interchange and research support.

Story Line: organisational knowledge acquisition dimension can be positively measured by the amount of collaborative data interchange and amount of research and development support appearing in a certain organisation.

Proposed Grounded Theory (2). The researcher faced a major dilemma in extracting a core category in the current theory. Reasons behind this dilemma were that the dimension ‘assimilation’ was found to a certain extent to be misleading regarding its organisational elements, this was noticed in both stages of literature review and data analysis. The understanding of assimilation is placed between two dimensions that are acquisition, and transformation and can occasionally incorporate mixed annotations from both. However, eventually, the researcher in the current research managed to compromise by accumulating all collected information from various sources and relying on the secondary researcher to reduce any biased conclusion. The resulting core category was “Readiness for data Obtainability.”

Core Category: Readiness for data Obtainability.

Proposed Grounded Theory (3). Extracting the third category was considered simpler compared to theory 1 and theory 2. The third theory involved knowledge transformation dimension of ACAP. Furthermore, concerning the process of relating all categories to technical and technological data proceeding initiatives in the interviewed organizations. Core category and the storyline for the third theory is as follows,

Core Category: Technical and Technological Data Handling Potential.

Story Line: organisational knowledge transformation dimension can be positively measured by the amount of technical and technological data handling potential within a certain organisation.

Proposed Grounded Theory (4). The final and fourth theory was concerning the last dimension of ACAP knowledge of ‘exploitation.’ The extracted core category accumulated understating from all categories in this theme. Here all categories encompassed of outputs and productions resulting from previous absorptive capacity dimensions initiatives. Resulting core category and storyline are as follows,

Core Category: Significant products and decisions.

Story Line: organisational knowledge exploitation dimension can be measured by the existence of significant products and decisions that are key categories of the overall organisational performance.

Qualitative Bias and Bias Reduction

In some qualitative research, the purpose of coding data is to arrange and systemise the overall ideas, concepts, and generate categories like the ones generated in the current research. The resolution of the coding process is to uncover the data through codes and categories (Gasson, 2009). However, the important challenge is to assess the quality of extracted categories and find ways for evaluating them depending on the researcher philosophical standpoint (Pope and Mays, 2009). In the current research developing a valid theory or set of theories was not the main goal of the research. For that reason, it was imperative to assess the quality of extracted categories that were required as key components used later in extracting the ACAP model. An approach suggested by Mays and Pope (2000) in qualitative research provides more richness to coded results by reducing bias shaped throughout a single researcher analysis. They suggested the use of the second researcher as an instrumental approach to reduce bias and protect a single individual interpretation of data. The current research examined the extracted categories that might affect the existence of ACAP within interviewed organizations. Significant propositions were observed while undertaking the bias
reduction in the current research processes and are justified throughout the following perceptive,

1. The dissimilarities and similarities between two researchers or more in (professional experience, personal characteristics, and perspective) can somehow result in variations when interpreting the same data.

2. Variances in researchers’ analysis of data or some part of the data might be resolved, and a mutual set of findings can be extracted from both researchers to come out with a synthesized set of categories, or final theory in grounded theory.

The procedure of bias reduction went across two main phases illustrated in the diagram in Figure 11.

**Qualitative Bias Reduction - Phase One**

Initially, in phase one, the second researcher who is senior researcher specialized in information systems and qualitative research, but not remarkably familiar with ACAP to reduce any bias that can affect categories extraction. The second researcher recited the lines of transcripts of the interviews aiming to understand the open view of the answers, and the logical interpretations of how the lines of text were coded to initial codes by the first researcher. Consequently, understanding the main themes of ACAP categorised in the axial coding phase. These processes of enlightening the second researcher viewpoints were a key driver in preceding with phase two of bias reduction, as phase two, was the actual execution required by the second researcher. The objective from the entire process of bias reduction was to establish a valid unified set of new categories that will be used in extracting the final model presented in Figure 10.

**Qualitative Bias Reduction - Phase Two.** In this phase, both researchers discussed and agreed on the contradictory ACAP codes. They then conducted a second open-coding step to combine the recognised conceptual categories. Additionally, the second researcher commenced an independent classification session attempting to map categories to their corresponding themes according to the second researcher own perception. Once this was done, the second researcher referred to the first researcher to discuss similarities and dissimilarities. As a Bias reduction process, the second researcher correspondingly made an additional attempt of coding, this coding was undertaken in phase two of grounded theory (axial coding) in which engaged the second researcher efforts in matching the extracted themes into their joint theme of ACAP.

**Research Implications and Contribution**

The findings indicate that the illustration of GTM phases employed in the current study can enrich manoeuvring aspects of novice qualitative researchers, which can be considered as a definitive enlightenment guide for novices in qualitative research. The findings can contribute to knowledge development reforming a strategic thinking methodology for initiating a useful shift in the substantives area of inquiry. Also, the research contributes to proposing a rigorous approach in eliminating bias that could appear after conducting data analysis in systematic approaches in grounded theory methodology.

This article offered key pragmatics guidelines of GTM that are obtainable for IS qualitative researchers to follow to build a
grounded systematic result. The guidelines are all extracted through analysing a set of profound readings in IS and grounded theory. The proposed implementation phases are intended to assist promoting the value, objectives, and quality of grounded theory research in managerial information systems and knowledge management disciplines, also, and as a result, contribute to theory improvement around information systems. The paper sets the perspective of implementing a qualitative research method to uncover pragmatic methodological insight of Grounded Theory Methodology (GTM).

The use of a computer-assisted qualitative data analysis software program (CAQDAS) can be used in the first two coding phases. CAQDAS in the current research was treated as a set of tools for moving beyond the theoretical ACAP understating to a more descriptive model grounded in data. Recent research claimed that using NVivo software in their methodological approach would positively lead to more quality-based research comparing to other research that does not tend to use analytical software such as NVivo (Johnston and Breckon, 2010). NVivo was used to facilitate the analytical grounded theory extraction approach significantly in the coding process and extracting the final set of theories (Andrew et al., 2010).

Future research will also incorporate evaluating the extracted categories and extracting rigorous grounded theories.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: The author named “Dr. Dalia Al-Eisawi” of the manuscript titled “Following a Grounded theory qualitative research in organizational knowledge management and absorptive capacity study declares that there is no conflict of interest, and that the submitted paper is not funded by any organization.

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### Appendix

**Extracted Codes**

| Themes/Axial        | Categories (c)/Open codes                  | Codes/Initial codes                                                                 |
|---------------------|--------------------------------------------|-------------------------------------------------------------------------------------|
| **Acquisition**     | C1: Management emphasis data exchange      | “Management encourages employees to use information sources within and outside industry” |
|                     |                                            | “Manage expects that employees deal with information beyond their industry”           |
|                     |                                            | “It is appreciated when employees procure information from other industries as well.” |
|                     | C2: Research And development initiatives   | “Joint Research Projects within the company”                                        |
|                     |                                            | “Joint Research Projects within the outside company”                                |
|                     | C3: Timely meetings with experts           | “Periodical meetings with external experts”                                         |
|                     | C4: Cross departmental data exchange       | “Concept exchange is cross departmental”                                            |
|                     |                                            | “Cross Departmental Support to solve problems”                                      |
|                     |                                            | “Personnel exchange for employees for certain projects amongst departments”         |
|                     |                                            | “Management Team sharing knowledge”                                                |
|                     | C5: Management emphasis for data distribution | “Employees are conscious about who Possesses specific skills and knowledge and for who Certain information is of interest.” |
| **Transformation**  | C6: Employees tendency for data transformation | “Our employees successfully link existing knowledge with new insights.”             |
|                     |                                            | “Our employees can apply new knowledge in their practical work.”                    |
|                     | C7: Organisational Policy for data transformation | “Our employees can structure, and use collected knowledge.”                        |
|                     |                                            | “Company policy encourages our employees to engage in further training and continuous learning.” |
| **Exploitation**    | C8: Innovative products services           | “Technological training for data transformation tools periodically”                |
|                     | C9: Prototypes support                     | “Company launches innovative products/services promptly about its research.”        |
|                     | C10: Adopting new technologies             | “Management supports the development of prototypes.”                               |
|                     |                                            | “Company can work more effectively by adopting modern technologies.”                |
|                     |                                            | “Management encourages employees to combine ideas cross-departmentally using analytical technologies.” |