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## Exploring mind mapping techniques to analyse complex case study data

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### Abstract

This paper discusses using mind mapping techniques as a viable and complementary approach for analysing the complex qualitative data collected during a research project. Using a case study methodology to undertake the investigation, data collecting focused on conducting semi structured interviews with employees of the Lebanese Association of SOS Children's Villages. This was followed by an exploratory exercise to analyse ten of the interviews conducted by using mind mapping techniques and assess the possible suitability of the technique for conducting qualitative data analysis. The study concludes that mind mapping is a suitable technique for analysing large amounts of qualitative research data collected from face to face semi structured interviews during a research project. The themes from these interviews could be presented visually and relied upon for communicating back the findings with ease. Detailed information about the themes and sub themes noted on mind maps could be recorded on a spreadsheet. This delivers an audit trail and facilitates conducting an in depth written discussion about the findings. This research adds to the limited quality mind mapping research data to date and suggests why considering the technique as a viable and complementary approach for analysing complex qualitative data is advantageous.

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**Exploring Mind Mapping Techniques to Analyse Complex Case Study Data**

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**Abstract**

This paper discusses using mind mapping techniques as a viable and complementary approach for analysing the complex qualitative data collected during a research project. Using a case study methodology to undertake the investigation, data collecting focused on conducting semi structured interviews with employees of the Lebanese Association of SOS Children’s Villages. This was followed by an exploratory exercise to analyse ten of the interviews conducted by using mind mapping techniques and assess the possible suitability of the technique for conducting qualitative data analysis. The study concludes that mind mapping is a suitable technique for analysing large amounts of qualitative research data collected from face to face semi structured interviews during a research project. The themes from these interviews could be presented visually and relied upon for communicating back the findings with ease. Detailed information about the themes and sub themes noted on mind maps could be recorded on a spreadsheet. This delivers an audit trail and facilitates conducting an in depth written discussion about the findings. This research adds to the limited quality mind mapping research data to date and suggests why considering the technique as a viable and complementary approach for analysing complex qualitative data is advantageous.

**Keywords:** mind mapping; data analysis method; qualitative research; auditing; systems audit approach

**1. Introduction**

Researchers need to plan and select a suitable approach for analysing research data and delivering quality findings. This analysis which is essential in both quantitative and qualitative projects (Cavana, Delahaye and Sekaran, 2001; Creswell, 2003), requires using an appropriate analysis technique which depends on the characteristics of the research project and the nature of

the gathered data. However, this analysis is often a hurdle for many researchers who may struggle to initiate the analysis required especially when the research project involves the collection of a large amount of research data. To address this hurdle, novel researchers could possibly use technological tools which may help organise the information into relevant categories (Sekaran and Bougie, 2013) before highlighting the frequency of occurrence of different events (Yin, 2009). While these tools are beneficial, it is imperative to understand that their purpose is to assist people in the analysis process and not to replace them. For instance, while Leximancer helps identify the main topics in a research interview and the relations between these topics, the tool only supports researchers in gaining a better insight into their data (Angus, Rintel and Wiles, 2013). In addition to the use of technology for analysing data, it is also possible to conduct the analysis manually and still deliver valid research outcomes (Bryman, 2008; Creswell, 2014). However, delivering these valid research outcomes depend on the discipline of researchers and their willingness to remain truthful to the research data (Corbin and Strauss, 2008) and by their inclination to discuss rival research findings (Yin, 2009). This paper discusses why mind mapping is a viable data analysis approach when a researcher needs to analyse large amounts of research data with many interconnected topic areas and communication nuances that may prove challenging to analyse and present holistically using the traditional linear thinking models.

## **2. Literature Review & Gap**

### **2.1 What is Mind Mapping?**

Mind mapping is a technique for delivering effective and creative thinking (Buzan, 1989, as cited in Mento, Mantinelli and Jones, 1999; Buzan and Buzan, 1996; Buzan, 2005). The technique helps in arranging and presenting research concepts visually around a central key word or idea (Borchardt, 2011; Burgess-Allen and Owen-Smith, 2010; Buzan, 1995, as cited in Kern, Bush and McCleish, 2006; Crowe and Sheppard, 2012; Meier, 2007; Mueller, Johnston and Bligh, 2002; Wheeldon, 2011). This visual presentation helps organise thoughts (Mattos, Mateus Junior and Merino, 2012), create ideas (Cheng, Hu and Chen, 2012), focus discussions (Chang and Chen, 2015), solve problems (Buzan, 2005), make decisions (Borchardt, 2011) and achieve learning (Mattos, Mateus Junior and Merino, 2012). Furthermore, mind maps present information and data in an organic and visual format that many of the proponents of the

technique claim can increase the ability to retain information (Buzan, 1976, as cited in Meier, 2007; Buzan, 1993, as cited in Meier, 2007; Buzan, 2005). When originally developing the technique, research attempted to gain an understanding of how people learn and remember (Mento, Mantinelli and Jones, 1999) resulting in gaining insights on how the brain operates. For instance, Zampetakis, Tsironis and Moustakis (2007) convey that the brain works by focusing on a central point from which outward ideas can be added and organised. Additional research uncovers the brain's division into two hemispheres which are connected together facilitating different intellectual functions (Buzan, 1991; Buzan and Buzan, 1995; Buzan and Buzan, 1996; Buzan and Buzan, 2006). By using both hemispheres, humans are able to think effectively and creatively (Mento, Mantinelli and Jones, 1999; Nast, 2006). Buzan and Buzan (1995) and Buzan and Buzan (2006) demonstrate this creativity by providing examples of the working notes of great thinkers such as Leonardo da Vinci and Picasso which reflect the use of the mental capabilities which exist in both hemispheres.

## **2.2 Where is mind mapping being used?**

Buzan, illustrates in a number of published sources the use of mind mapping educationally to facilitate teaching and thinking, and professionally for meetings, presentations, and management. Other uses include analysis and problem solving (Buzan and Buzan, 1995; Buzan and Buzan, 2006).

The review of the literature uncovers many instances which demonstrate the potential applications illustrated by Buzan. One example of this application in business explains how mind mapping assists in delivering projects and facilitates communication between various project stakeholders before providing an example that shows the use of the technique for monitoring and managing project costs (Borchardt, 2011). Rosenbaum (2003) also demonstrates how the technique adds value when working on projects, specifically to negotiate, communicate, analyse information and manage projects. A third example by Mattos, Mateus Junior and Merino (2012) presents the use of the technique for managing the productive maintenance activities of the pulp and paper industry in Brazil in order to deliver collaboration between various members that are involved in these activities. Financial planners also use the technique to chart the financial situation of their clients and deliver innovative solutions which can help these clients track towards delivering their financial objectives (Rouillier, 2011). Other uses of mind mapping

include taking notes for books, articles and meetings, making presentations, managing various aspects of life, and making good decisions (Pollitt, 2007). Additionally, Public Relations (PR) practitioners, especially those that recognise that creativity often constitutes the differentiation factor that is necessary to impress prospective clients and win a project use the technique. In saying this, the limited use of mind mapping can be attributed to the failure to recognise the value that is possible from using the technique (Estanyol and Roca, 2014).

Examples of using the technique academically also exist, for educating students and for undertaking research. However, Wheeldon (2011) points out that the use of the technique for conducting qualitative research is relatively new. Add to this, Burgess-Allen and Owen-Smith (2010) highlight that although a number of instances exist which convey the use of mind mapping in research, reporting on this use in detail is rare leaving this potentially useful technique outside of mainstream academic focus. Of the rare examples of using mind mapping for academic purposes, Kokotovich (2008) demonstrates the value of the technique and use for educating first year industrial design undergraduates to think creatively and analyse problems during the early stages of a design process. Zampetakis, Tsironis and Moustakis (2007) also demonstrate the use of the technique, this time to educate engineering students who need to think critically and creatively. The study uncovered how it is possible to encourage students to use mind mapping which is advantageous due to the technique's ability of, making tasks interesting, improving the ability to concentrate and enhancing the ability to remember and think creatively. However, additional research that demonstrates the use of the technique by students from various university faculties is essential to generalise the findings about the preferences of students when it comes to using the technique (Zampetakis, Tsironis and Moustakis, 2007). The use of the technique by Kollock, Flage, Chazdon, Paine and Higgins (2012) on the other hand is during an investigation with a focus on understanding the impact on people's lives as a result of implementing an 18 month community program to strengthen leadership and reduce poverty. The authors collected the data during interviews by using mind maps before transferring the information from these maps onto an excel spreadsheet for coding and analysis (Kollock et al., 2012). Another example of using the technique for research is in the study of Meier (2007). The study focuses on using mathematical modelling to make decisions and manage gun crime. For reaching an answer to the problem, Meier uses mind mapping to capture the beliefs of participants from various disciplines on what gun crime is, resulting in a consensual

understanding of what the term means.

### **2.3 Is Using the Mind Mapping in Research Useful?**

To assess the feasibility of using mind mapping techniques when undertaking an academic research project, the study undertakes a review of the literature papers which focus on the topic in the Business Source Complete, Scopus and Web of Science databases. The aim of the review is to identify possible uses and recognised methodologies for using the technique. This review uncovered a number of examples of using the technique in research to collect and analyse the data.

To collect data, Wheeldon (2011) conveys the use of the technique by research participants to construct their experiences graphically. This viable and complementary approach to the 'observations, interviews and focus groups' conventional data collection methods helps collect more detailed and reflective information from participants. This is proven by the differences in the number of concepts identified by participants using and not using the technique resulting in the author concluding that people who use the technique can generate more concepts from the research than people who do not. Furthermore, research participants who use mind maps to record information provide more in depth responses by connecting various research concepts and providing examples from their experiences. However, more evidence can be valuable to assess the value, challenges and limitations of using the technique, considering that the relationship between the researcher collecting the data and participants may have influenced responses and the research findings. Additionally, concerns with the findings such as the need to better define detail and depth require addressing by considering suitable academic definitions for the term in order to properly assess the quality of the research findings. Burgess-Allen and Owen-Smith (2010) on the other hand illustrate the use of the technique to collect data during focus group discussions. The authors explain that the technique helps identify the linkages which exist across various identified themes and in turn helps deliver the research rigour expected when gathering data from health patients in an environment where time may be scarce. In saying this, the authors explain that success in using the technique requires the ability of an investigator to probe with questions and clarify collected information which may be vague. Additionally, researchers must consider and address the concerns associated with using the technique. One of these concerns relates to data validity due to the human judgment which plays

a factor when building maps, especially in the choice of words to represent participant's comments and the location for placing these comments on a map. The authors explain that this validity is still possible by researchers portraying and exploring the reasons behind the exceptions which appear in a research project. Zampetakis, Tsironis and Moustakis (2007) like Burgess-Allen and Owen-Smith (2010) explain that the technique is useful as it facilitates eliminating possible omissions when collecting important data. The ability to eliminate these omissions is possible by researchers listening to the audio recordings after using a mind map to collect the data, in order to identify information possibly missing from the map (Burgess-Allen and Owen-Smith, 2010). This approach increases the validity of the data. The authors also convey that the method helps address the potential loss of nonverbal nuances which may be lost when transcribing the data. Gavrilova and Gladkova (2014) discuss another example of using the technique, this time to present data collected about entrepreneurship, in a research project involving the Graduate School of Management in St. Petersburg State University and the Higher School of Management in the National Research University in Moscow. The result from the project which started in 2006 includes a display of the collected research data from 67 countries with a minimal sample size of 2000 adults per country, on a single sheet mind map. This shows that using visual techniques such as mind mapping to present the data helps to understand the meaning embedded when collecting large amounts of data (Gavrilova and Gladkova, 2014).

From the available literature, little evidence does exist of researchers using the technique to collect data in semi structured interviews. In saying this, Burgess-Allen and Owen-Smith (2010) claim they used the technique to capture research data from individual research participants. However, the review of publications by these authors shows no evidence of this use. With a lack of evidence and information about the process to use for analysing semi structured interviews data by using the mind mapping technique, mind mapping may constitute a viable and complementary approach for conducting research analysis which is not covered extensively in existing literature and is worth further investigation.

### **3. Research Method and Scope of The Study**

This paper focuses on illustrating how mind mapping techniques are helpful in analysing the large amount of collected data to audit the communication practices in the Lebanese Association of SOS Children's Villages. The selection of the research methodology,



case study, is the result of reviewing the literature of numerous authors some of which include Barratt, Choi and Li (2011), Dubois and Araujo (2007), Dubois and Gadde (2002), Dubois and Gadde (2014), Dyer and Wilkins (1991), Eisenhardt (1989), Ravenswood (2010), Siggelkow (2007), Tomasini and Van Wassenhove (2009), Verner and Abdullah (2012) and Yin (1994, 2009). This review illustrates two dominant researchers, Eisenhardt and Yin, with immense contribution to legitimising case study research (Dubois and Gadde, 2014). These researchers prefer to use multiple case research studies instead of individual cases, due to their belief that they can provide more robust and compelling research findings (Eisenhardt, 1989; Yin, 2009) which is possible by the comparison of various organisational contexts (Dyer and Wilkins, 1991). This tendency however should not imply that single case research cannot deliver substantial contribution especially when many of the studies advancing the knowledge of organisations and continuing to have an impact on the management field are based on a single case study research. These single case studies instead of allowing comparisons across various organisational contexts, allow comparisons within the same organisational context (Dyer and Wilkins, 1991). Siggelkow (2007) agrees with this view and conveys that using a single case can be insightful as demonstrated in neurology and management studies. Achieving these insights require carefully selecting a research case which may provide an insight that may not exist in other cases. This review illustrates that value is achievable when conducting case study research regardless of the number of selected cases. This value is possible by collecting information from various sources and conducting an in depth analysis of a case (Creswell, 2014; Hume and Leonard, 2014) which facilitates an understanding of the relevant contextual information (Dubois and Gadde, 2002). Gaining this in depth analysis requires asking ‘how’ and ‘why’ questions to understand and present the context that exists within a specific environment (Rowley, 2002; Yin, 2009). However, convincing readers of the value of this methodology, specifically when conducting single case study research, depends on researchers taking the time to describe the methodological research process which is often missing (Dubois and Araujo, 2007). Additionally, researchers should not lose sight of the important investigation dimensions and issues, which occur when needing to analyse a large volume of research data (Halinen and Törnroos, 2005).

Using a case study methodology to complete the investigation, the collection of data involved conducting semi structured interviews with employees who hold managerial and

operational responsibilities in the Lebanese Association of SOS Children's Villages. The responsibilities of these participants include but not limited to planning direction, managing finances and providing care. Analysing the large amount of research data proved a challenge by using the traditional linear thinking models due to the many interconnected topic areas and communication nuances. To manage this challenge and assess the suitability of the technique in conducting qualitative data analysis, an exploratory attempt to analyse ten of the research interviews followed. This attempt uncovered that the literature provides no framework that guides on how to use mind mapping to analyse research data. Saying this, the literature highlights an interest in using techniques for visually collecting research data (Palmer, Dowrick and Gunn, 2014). This interest also covers the use of visual methods for analysing research data which is a research area in its infancy (Angus, Rintel and Wiles, 2013). To attempt using the mind mapping technique for data analysis, the investigation develops and uses the structured process shown below:

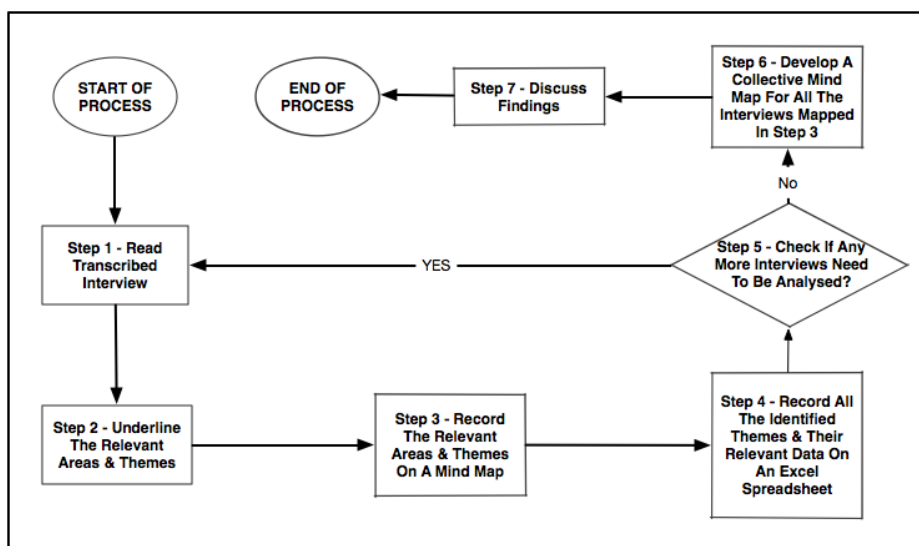
1. Read a transcribed interview
2. Underline the relevant areas and identify the themes in that transcript
3. **NB:** This process recommends transcribing the data at the end of interviews which allows time to develop accurate and complete transcripts. However, researchers can avoid the need to create data transcripts in order to save time by listening to audio files and noting the themes that appear in interviews directly onto a mind map. However, not having a hard copy of transcripts workings may prove problematic when doing research where reviewers may wish to cross check the analysis work with the research data and notes.
4. Record the relevant interview data and themes on a mind map
5. **NB:** This process recommends allowing time to read each transcribed interview and work with the data in order to present complete themes on a mind map. The ten mind maps for this investigation display findings from each interview that relate to the main topics of the investigation some of which include communication, risk management and stakeholders.
6. Record the themes identified in interviews and other relevant data on an excel spreadsheet
7. **NB:** This spreadsheet conveys the various themes that appear in interviews. This

spreadsheet is beneficial to research examiners who want to cross examine the information in various sources.

8. Check if additional interviews need analysing by following steps 1 to 4
9. Develop the collective mind map which represents the information from the ten analysed interviews

**NB:** The collective mind map for this investigation displays in Figure 2 the main findings from the ten interviews and a count of recurrent themes.

A visual flow of the process for creating the collective map is shown in Figure 1:



**Figure 1:** Process for Creating a Collective Mind Map

#### 4. Findings

This pilot study analysed a sample of ten interviews using mind mapping to investigate the suitability of the technique for analysing large amounts of research data. The process is an interesting exploratory exercise in the absence of a known theoretical framework for using the approach to analyse research data. The findings from the exploratory exercise highlight that the technique is suitable for analysing research data. Additionally, the use of the technique facilitates summarising and discussing research findings. The study to audit the communication practices in the Lebanese Association of SOS Children's Villages demonstrates these findings and shows how the technique enables the organisation of thoughts, the analysis of the large amount of

research data, the identification of the concepts present within interviews and the communication of findings with ease. This is interesting considering the initial feeling of frustration due to the inability to easily and consistently articulate the findings from the field work. This is in line with the findings of Mattos, Mateus Junior and Merino (2012) and Buzan (2005) that mind mapping helps in organising thoughts and solving problems. The collective mind map which shows the themes emerging from analysing the ten interviews and the number of times these themes appear is shown in Figure 2.

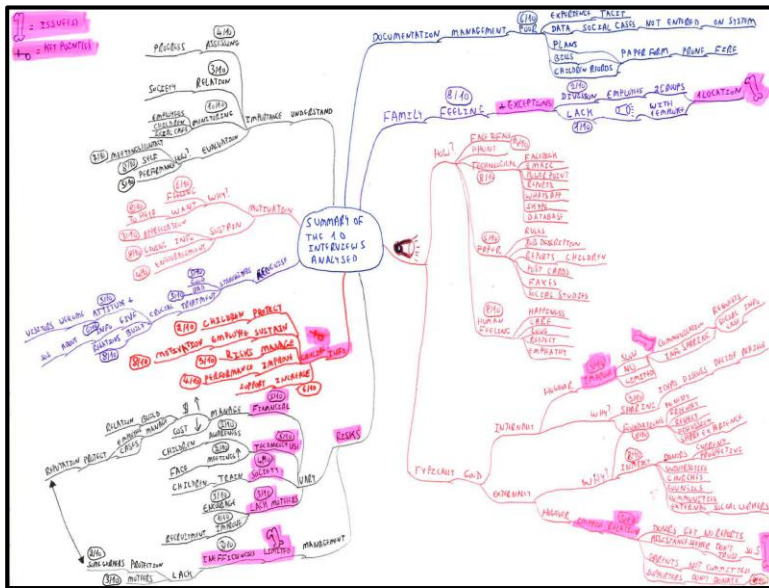


Figure 2: Interviews Collective Mind Map

The map provides an overview of the findings from all ten interviews although the investigation did not involve using a computer software for arranging the data. This is inline with the reporting by Hampton (2015) from the Department of Curriculum and Quality Enhancement in the University of Portsmouth that a mind map does not have to look attractive in order to develop a visual overview of information about a topic.

Information about the findings from this analysis is shown next:

- The importance of having a positive and welcoming attitude towards stakeholders appearing 5 times in interviews. How and why to display a positive and welcoming

attitude towards stakeholders is illustrated in Table 1.

How?	Why?
<ul style="list-style-type: none"> <li>•Employees spending time speaking to visitors and showing them around the village</li> <li>•Inviting visitors to have lunch in children’s homes</li> <li>•Running activities in the village to deliver a positive atmosphere</li> <li>•Allowing children to approach and interact with guests</li> </ul>	<ul style="list-style-type: none"> <li>•Attract new sponsors and generate more income</li> <li>•Ensure that eligible assistance seekers feel comfortable in seeking assistance</li> <li>•Retaining the association’s existing financial support from international bodies</li> </ul>

**Table 1:** How & Why to Display a Positive & Welcoming Attitude towards Stakeholders?

- The importance of giving stakeholders information appearing 6 times in interviews. What information to provide to stakeholders and why is illustrated in Table 2.

What Information?	Why?
<ul style="list-style-type: none"> <li>•Reports about the progress of children that donors are sponsoring</li> <li>•Information about the work of SOS</li> <li>•Stories about the impact that the work of SOS had on children who were previous beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>•Create awareness about the work of the association which may often not be known or at least not be evident to people in society</li> <li>•Leave a positive impression on current and potential stakeholders, which may help drive the support needed</li> </ul>

**Table 2:** What Information to Provide to Stakeholders & Why?

- The importance of building relationships with stakeholders appearing 8 times in interviews. How and why to build relationships with stakeholders is illustrated in Table 3

How?	Why?
<ul style="list-style-type: none"> <li>•Engage in personal communication with stakeholders using technological (email reports about progress of sponsored children, media appearances to talk about the work of SOS and the results achieved) and non technological mediums (face to face contact with people visiting the village, face to face visits to members in the local community to explain that the association exists to help them and that educating and allowing women to work is not a bad thing, speaking to local community members who are benefiting from the work of SOS and checking if they can explain to other possible beneficiaries who don’t trust the association about the good work of SOS)</li> </ul>	<ul style="list-style-type: none"> <li>•Sustain the associations longevity by maximising the financial support available from personal, corporate and other international donors</li> <li>•Attract new assistance seekers that no longer feel threatened by the association</li> </ul>

**Table 3:** How & Why to Build Relationships with Stakeholders

The spreadsheet mentioned in the 'Process For Creating A Collective Mind Map' (See Figure 1 - Step 4) facilitates data analysis and the delivery of the information displayed in Tables 1 to 3. Additionally, the spreadsheet allows data to be cross checked with various data sources such as transcripts and mind maps. For this analysis, the spreadsheet uncovers a number of potential communication improvements in the association. However, discussing these improvements is beyond the scope of this paper.

#### **4.1 What Does This Analysis Represent?**

In summary, evidence from this pilot investigation demonstrates that the mind mapping technique is useful for analysing research data. This may be especially valuable when analysing complex environments with large amounts of research data which is difficult to analyse using the traditional linear thinking methods. Alternatively, mind mapping helps present the data and recurrent themes on a single page which is easier to analyse. This finding is inline with the finding of Gavrilova and Gladkova (2014) which highlights how the mind mapping technique helps present the large amount of data in a research project. Additionally, the quality of the work can be easily audited by referring to the spreadsheet which provides additional information about the findings in the collective mind map, the map which summarises the information from numerous maps. Additionally, the spreadsheet provides both an audit trail and a base for conducting additional analysis about a case study.

#### **5. Theoretical & Practitioner Implications**

Researchers are able to use mind mapping for analysing the large amount of research data and presenting the findings from this data with ease. This is evident from the attempt to audit the communication practices in the Lebanese Association of SOS Children's Villages where after almost a year of being unable to communicate the findings from the investigation with clarity and ease, the technique helped achieve a breakthrough by facilitating presenting the findings from each interview on an individual mind map. The power of the technique is not only in mapping individual interviews but also in creating integrative maps which can communicate the findings from numerous research participants. These integrative maps are considered good maps as they extend beyond the initial delivery of descriptive information (Mento, Mantinelli and Jones, 1999). For the analysis method proposed in Figure 1, creating maps on par with an

excel spreadsheet provides a data cross referencing ability in addition to detailed information about the themes and sub themes encountered in interviews. This information helps in analysing the research findings and provides a trail for auditing the work by potential third parties.

However, before using mind mapping for research data analysis, researchers must understand and address the concerns in the literature which relate to using the technique and whether these concerns are warranted. These concerns include:

- (1) The need for more academic scrutiny to assess the suitability of the technique in qualitative research (Burgess-Allen and Owen-Smith, 2010; Wheeldon, 2011).
- (2) The need to academically define what detail and depth mean in order to properly assess mind mapping research findings (Wheeldon, 2011).
- (3) Choosing biased research participants who may not deliver the full picture (Kollock et al., 2012) or may not provide the depth of research responses (Wheeldon, 2011).
- (4) The possible non suitability of using the technique for conducting exploratory inquiries (Burgess-Allen and Owen-Smith, 2010).
- (5) The suitability of the technique for answering what questions but not necessary why questions (Burgess-Allen and Owen-Smith, 2010).
- (6) The possibility when using the technique to find it difficult to capture contradictory comments which would result in overlooking these comments for the purpose of retaining coherent research findings (Burgess-Allen and Owen-Smith, 2010).

Research to date did not address the first concern about the suitability of mind mapping in qualitative research. However, extensive evidence exists surrounding the benefits and creativity that are possible from using mind mapping in both the business and academic fields. Furthermore, this current attempt to use mind mapping for analysing the fieldwork research data is proving beneficial to communicate the findings from this qualitative investigation.

With regard for the second and third concerns which relate to academically defining what detail and depth mean and the selection of suitable research participants, these are addressed during the process of developing the research methodology by considering the quality that is expected when undertaking a qualitative research project. For example, a well designed qualitative research project considers how research findings will be triangulated and the processes to use for maintaining the chain of evidence. Additionally, this analysis considers the process to use for identifying and selecting suitable research participants, those that can provide the expected

research depth.

Regarding the fourth concern mentioned in Burgess-Allen and Owen-Smith (2010) about the unlikely suitability of mind mapping techniques when conducting exploratory inquiries, findings from this exploratory investigation are in contradiction with that evidence and demonstrate the possibility of analysing large amounts of exploratory project data by using mind mapping before merging the findings and communicating them with ease.

Another contradiction is with the claim of Burgess-Allen and Owen-Smith (2010) that the technique is good for answering what questions, but not necessary why questions (i.e. information about what information not for profit organisations need to provide to stakeholders but not why this information needs to be provided). Once again, analysing the case data highlights that using mind mapping helps uncover practices that an institution uses and facilitates understanding why these practices are used. To achieve this depth, researchers must be willing to focus on the research data in order to gather detailed information about a case and uncover possible contradictions in the data. This finding is inline with the view mentioned in Yin (2009) about the skills required by researchers for conducting a good case study research. The author elaborated on this view by explaining that case study research is not only about a mechanical data collection, but rather, about focusing on the immediate interpretation of the research data in order to conduct an investigation which is not biased leading to accepting that contradictory evidence may surface (Yin, 2009). If researchers fail to analyse and interpret the information on hand with an open mind, research findings would end up being a descriptive representation of participant's information which is unlikely to meet the originality check necessary in research projects.

The final concern of Burgess-Allen and Owen-Smith (2010) is that mind mapping makes capturing contradictory comments difficult and results in overlooking contradictions for the purpose of retaining the coherence of findings (Burgess-Allen and Owen-Smith, 2010). However, this is not necessarily the case and contradictory findings can be presented using mind mapping if investigators show diligence when conducting exploratory research. Investigators can demonstrate this diligence by looking for surfacing contradictions in the research data and attempting to uncover the reasons behind such contradictions. In fact, contradictions are expected in qualitative research projects and as Corbin and Strauss (2008) stipulate, a researcher's job is to remain truthful to the research data and discuss all possible contradictions



which appear when analysing that data. The ability to highlight contradictions is evident in the collective mind map where both good and poor communication practices in the association are presented (See Figure 2). However, failing to detect contradictions is possible if an investigator lacks the skills and the willingness to accept that contradictory views may surface. This is why equipping researchers with the skills they need to conduct a research project is important. Additionally, researchers must be willing to accept and express varying views they may encounter when analysing research data which helps generate quality research findings (Burgess-Allen and Owen-Smith, 2010).

Overall, the findings from the study which used the mind mapping technique for analysing research data adds to the existing methodological research knowledge and provides a viable and complementary approach for data analysis which is typically unexplored academically, and thus makes exploring using the technique beneficial. The review of the previous literature highlights a discussion by Burgess-Allen and Owen-Smith (2010) on the use of the technique for collecting focus group data from current and past alcohol misusers. The authors state in that paper that they previously used mind mapping to capture the key themes from individual research interviews. However, with no evidence of this use or publications in the area, this paper contributes to the literature with the focus on developing a viable and complementary methodological process for using mind mapping to analyse semi structured interviews and report on this use.

## **6. Conclusion**

This paper demonstrates by using the Lebanese Association of SOS Children's Villages as a case study that mind mapping is a suitable technique for analysing the large amount of research data collected during a research project. This conclusion is in line with previous research findings which illustrate that using the technique in both the business and academic fields is beneficial. The technique not only helps identify recurrent themes but also facilitates communicating with ease the themes appearing by interviewing employees working in a complex non-standard operational environment. Additionally, the technique helps uncover improvement opportunities and provides an ability to analyse and compare contradictory findings and exceptions across different locations. This is why researchers could consider the technique as an option for analysing research data, especially when large amounts of research

data needs to be analysed which may be challenging to analyse using the traditional linear analysis models.

### 6.1 Limitations & Recommendation for Future Research?

This pilot study developed a collective mind map by analysing a small sample of ten interviews using the mind mapping technique. While this investigation highlighted that the technique is suitable for analysing large amounts of research data, it is recommended to undertake additional research where the mind mapping technique gets used to analyse a larger sample set. Additionally, the technique may be used to collect and analyse data from different settings. Such work should be reported back in depth, not only to deliver more academic validity, but also to provide researchers interested in using the technique with information on how they can successfully achieve this goal and the limitations they will need to consider and address.

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