7

The Application of the Case Study Methodology: Resilience in Domestic Food Supply Chains During Disaster Relief Efforts in South Asia

Mark Wilson, Muhammad Umar and Jeff Heyl

Introduction

This chapter will explore the execution of the field work for a research project centred on two disaster-prone regions in Pakistan. We first discuss the case study method and its suitability to humanitarian logistics researchers and then apply the method to an actual research project and discuss the data gathering phase. This work is offered as a reflective piece that would be useful for humanitarian logistics researchers and research students conducting case-based research in general and intending to work in the South Asia area in particular. The work adopts a qualitative case study approach and explores in depth the methodological justifications for the use of such a method in a context/region typically encountered by humanitarian logistics researchers. Indeed, given the difficulties of collecting data in an environment characterized by a fluid, confused, often dangerous research context with a rapid rotation of entities and personnel, traditional quantitative methods and instruments such as formal surveys are problematic to say the least. Hence, a rigorous case study framework is offered that could provide a template or an example of sorts for future researchers. This chapter takes the reader from the process of

M. Wilson (✉) · M. Umar · J. Heyl
Lincoln University, Lincoln, New Zealand
e-mail: Mark.Wilson@lincoln.ac.nz; Muhammad.umar@lincolnuni.ac.nz; Jeff.heyl@lincoln.ac.nz

G. Kovács et al. (eds.), *The Palgrave Handbook of Humanitarian Logistics and Supply Chain Management*, https://doi.org/10.1057/978-1-137-59099-2_7

deriving the research problem from literature, to the detailed design of the field work and cumulates in the actual in-country data gathering phase. The focus is on the experience of the researchers and the suitability of the case method during the data gathering phase to provide some insights for humanitarian researchers.

This method of necessity can only be understood in the context of the research aims and objectives. Hence, a further offering is a conceptual framework for determining the resilience of food supply chains drawn from the supply chain resilience and disaster management disciplines. It is argued that while the literature for supply chain resilience in the disaster context is still developing, there are few consolidated frameworks that seek to explain food supply chain resilience with a focus on disaster relief. The proposed framework argues that resilient food supply chains possess the capabilities of agility, adaptability and alignment (Lee 2004) in each of the four supply chain operational areas of logistics, collaboration, sourcing and knowledge management. These capabilities are facilitated further when actor's attitudes towards supply chain orientation and risk management are enhanced (Kovács and Spens 2007). In this chapter, the readers are asked to focus on the logical progression of the *process* and *steps* taken for each section for the research formulation and then execution of the in-country data gathering as a potential exemplar for case-based research in disaster-prone regions. The concluding section offers advice and lessons learned for researchers intending to work in South Asia region in general and Pakistan in particular.

Research Approach – Inductive/Deductive

All researchers need to decide between deductive and inductive approaches as they consider their options for empirical research. Depending upon one's philosophical position, either one of these or a combination can be used in the research. The deductive approach suits natural and physical sciences (Saunders, et al. 2011). It is mostly applied when theory leads to research. A theoretical framework is developed and the researcher tests that framework through data taken from samples. Researchers then generalize these data to the whole population (Bhattacherjee 2012). Typically the researcher, after a literature review in a particular domain, deduces certain hypothesis and then through research strategy tests these hypotheses. Basic steps involved in a deductive approach are theory, hypothesis, data collection, analysis and hypothesis testing.

When theory building is the aim of the research, this usually requires an inductive approach. Generalized inferences are extracted from observations,

often on an iterative basis (Bhattacherjee 2012). Here the researcher collects data and as a result of simultaneous data analysis, a new theory is generated. This is then tested further and refined until confidence in the theory formulation can be had. Due to qualitative data usage in inductive research it is not highly structured like deductive research. As the inductive approach is dependent on words, descriptions, feelings and derived meaning from observations and narratives, it is seen as more subjective and depends on the 'perception' of the 'social actors' about how they construct 'reality'. With inductive approaches, the researcher tries to find the meaning social actors attache to the reality they perceive. Generally, induction has an open and flexible approach, which provides opportunities to deal with any unexpected issues raised during the research process (Johnsen 2011), and this flexibility is better able to cope with uncertain humanitarian research contexts.

It has been argued that humanitarian supply chain research, where inter-agency relationships are the centre of attention, is neither entirely inductive nor deductive (Dubois and Gadde 2002). Hence, this research has adopted a 'moderate constructionism perspective' where the inductive approach is primary but with elements of deductive reasoning (Dubois and Gadde 2002, Järvensivu and Törnroos 2010). The reasoning for this is that the deductive element of this research is partially driven by extant theory within the disaster management and supply chain management disciplines. Hence, research of this type will not test theory *per se*, but rather will try to build on existing theory. Thus, a conceptual framework has been developed from existing supply chain resilience and disaster response literature. This framework is presented as follows (Fig. 7.1).

Following this, an inductive approach will be followed as this research is primarily concerned with building on this theory through qualitative data collection. The intent is to build depth of insight (by no means complete) of what is happening in disaster-prone areas, such as South Asian countries, in terms of food supply chains during times of disasters. As Creswell (2013) has rightly suggested, if empirical research on the topic is limited then an inductive method of generalizing from data would be the most appropriate method.

Many research strategies have been suggested by different authors to be used in qualitative research. However, Creswell (2013) has suggested five important qualitative methods of inquiry. These are narrative, phenomenology, ethnography, grounded theory and case studies. Narrative and phenomenology are associated with study of individuals. Ethnography is concerned with broad cultural sharing of behaviour in groups, while grounded theory and case study are used when researcher wants to explore events, activities and processes where little theoretical work has been done previously. Hence,

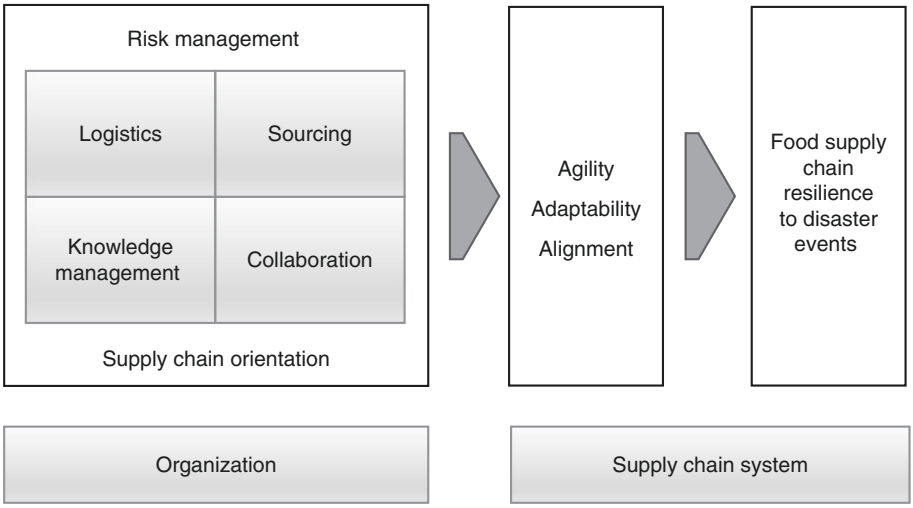

Fig. 7.1 Conceptual framework for resilience in domestic food supply chains. Source: Authors

this work has adopted a case study inductive approach. In fact, as the focus of the study is the supply chain or multiple supply chains, it seems that the most appropriate unit of analysis is the 'supply chain' as a system. In particular, our attention is narrowed further to the retail or distribution end of the supply chain in disaster-prone regions as the most likely to be integrated into or run parallel with relief supply chains.

Research Process

The research process used in this chapter can be categorized into three steps (Fig. 7.2). First, a review of literature and development of the conceptual framework, second the development of the survey (case study) protocols and finally the actual data gathering.

The first step was the preliminary literature review which resulted in the identification of the main extant issues. In particular, *food supply chain resilience* is a growing area of research that logically interconnects with areas such as commercial food supply chains, relief supply chains, resilience and disaster management (Fig. 7.3). The literature related to these areas was very helpful in understanding the concepts and emerging issues in the supply chain resilience discipline. The keywords that were used in search engines, databases and university library catalogues were resilience, supply chain, food

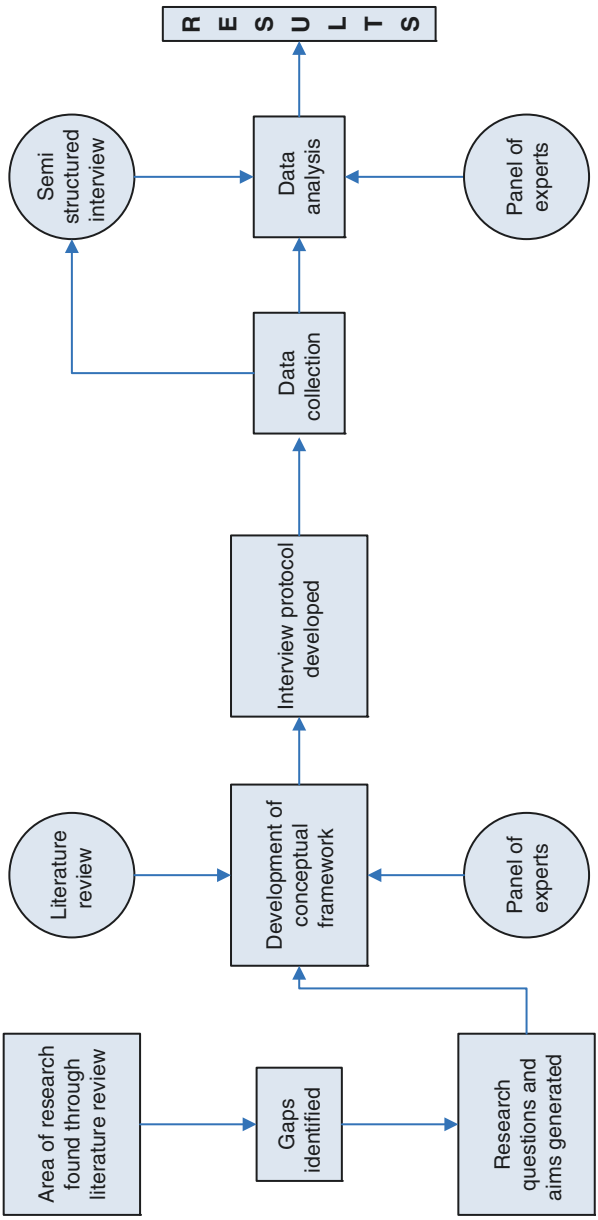

Fig. 7.2 The research process. Source: Authors

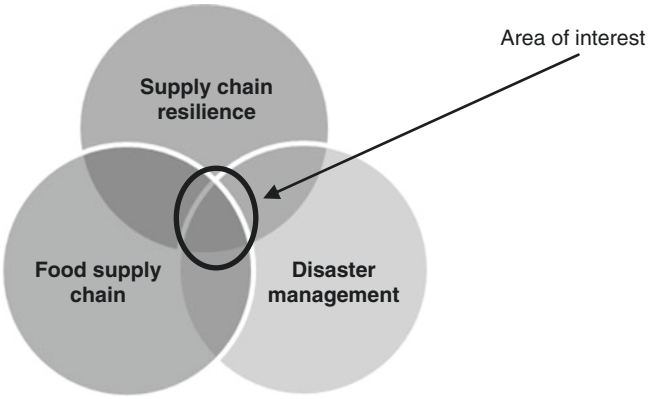

Fig. 7.3 Main research themes. Source: Authors

supply chain, disaster management, relief supply chain, supply chain risk management and food chain resilience.

After identifying some key articles and sources (e.g. Ponomarov and Holcomb 2009; Christopher and Peck 2004) related to supply chain resilience, it became easier to identify further journals, articles and books related to this research. The quality of journals was also kept in view while searching for literature; however, this was not a determining factor when highly related papers with good theoretical background were identified. The preliminary literature review was helpful in identifying emerging issues in the supply chain resilience discipline which helped shape the overall theoretical framework. Next, research questions and objectives were refined several times in the process and checked against literature to ensure a degree of novelty. Key concepts and areas were identified after focusing on a variety of frameworks and factors. What finally emerged was a food supply chain resilience conceptual framework. Initially the framework was representation of several concepts and was piloted in front of a panel of experts and researchers from *Resilient Organizations*, a Research Centre based in Canterbury, New Zealand. The panel consisted of key personnel from the organization's supply chain discipline. The aim was to refine the conceptual framework and to increase the reliability of the research. The second step was to develop the interview protocol. Literature was again thoroughly referenced to generate relevant questions related to the concepts included in the conceptual framework. The interview protocol is major way of increasing the reliability of the research and is an essential guide for researchers in data collection phase of case research (Yin 2014). The research instrument was then pilot

tested on a single food supply chain in New Zealand. Piloting case study helps to refine data collection process. Pilot tests are not a 'pretest' *per se* which is more like a dress rehearsal. For case research, pilot testing is more formative assisting the researcher to develop relevant lines of questioning and increasing the face validity of the questions and protocols (Yin 2014).

Finally in the last step, the data collection phase was conducted. The design of this research was for data to be gathered from key informants of four different food supply chains in South Asian region (more on the rationale of this design later). The data collection approach was a qualitative using the in-depth interview as the main data collection tool. A semi-structured interview technique was used in which the interview protocol played a major role. This research also used company reports and other relevant public documents as secondary data. This study also considered collecting data from a broad range of informants for comparative analysis. During the research, respondents were also asked to refine/explain their comments where meaning was not clear. This exercise is called 'respondent validation' and is used to validate the research. Subsequently, feedback questions were also asked to capture the perceptions of respondents which were used to validate the conceptual framework. Interviews were digitally recorded, field notes were also taken recoding observations and other facts. As the interview language was Urdu (the national language of Pakistan), the handwritten field notes and audio recordings were transcribed first into Urdu and then into English. A random sample of the English was then back-translated into Urdu to check for consistence of meaning over the two languages. While there were some words that had no direct translation, the meaning was compared to ensure the intent was translated. Finally, the text was then coded, condensed, displayed to allow further analysis and conclusions to be drawn.

While this outlines the research process in general, it would be helpful at this stage to step back and examine the underlying epistemological approach so as to appreciate the reasons why particular methods and techniques were used in this research.

Case Study Methodology

A case study is 'an empirical enquiry which investigates a contemporary phenomenon in depth and within its real world context especially when boundaries between phenomenon and context may not be clearly evident' (Yin 2014, p. 13). Thus, the case study is recommended to be used in research when a researcher has to answer questions like 'how' and 'why'. Furthermore, if the researcher has no control over the behavioural events and the research is focused

more on contemporary events, then case study methodology is recommended (Yin 2014). Similarly, case study methodology is appropriate for exploratory investigations of some new phenomenon which could be related to a person, group, family, situation, community or any cultural group (Meredith 1998). Hence, the case study deals with processes and puts more emphasis on a thorough analysis of a limited number of events and their interrelations. VanWynsberghe and Khan (2008) state that the case study methodology does not have a specific disciplinary orientation, thus it can be used in social science, applied science, business and humanities. Easton (1995) argues that the case study is the most suitable approach to study business relationships and supply networks. Furthermore, Gummesson (2007) and Halinen and Törnroos (2005) have also pointed out the importance of case study methodology in studying supply networks. This method gives the opportunity to the researcher to be close to the study's objects, thus enabling inductive and rich description of the phenomenon. Case study is most appropriate in a situation where little is known about the topic and where current theories seem inadequate, as is the case for our research (Easton 1995; Yin 1994).

Case studies can be used to accomplish different aims (see Table 7.1 below). Yin (2003) divides cases into exploratory, descriptive and explanatory. Eisenhardt (1989) recognizes description, but emphasizes the role of the case study in generating and testing theory. Stake (1994) highlights the value of intrinsic case study, where rich description of single case study is seen valuable as such. In the management discipline, theory generation seems the most discussed type of case research (Miles and Huberman 1994; Eisenhardt 1989; Glaser and Strauss 1967; Yin 2003).

Table 7.1 Different types of case studies

	Exploratory	Descriptive	Explanatory
Purpose	This type of case study is used for those areas or situations in which the phenomenon being evaluated has no clear single set of outcomes (Yin 2014).	This type of case study is used to present complete description of the phenomenon within its real-life context (Creswell 2013).	When a case study is used to answer the question that sought to explain the presumed causal links in complex real-life context that are too complex for a survey strategy (Yin 2014).
Questions	Why, How	Who, What, Where	How, Why
Example case studies	Peck (2005), Bozkurt and Duran (2012)	Coles et al. (2012), Kneafsey et al. (2013)	Agarwal and Subramani (2013)

Source: Authors

In the humanitarian logistics context, while many insights can be drawn from our commercial colleagues, much of the research can be classified as exploratory. As such exploratory studies are used to answer the 'what is happening' questions as well as seeking new insights and assessing the phenomenon in a new way (Robson 2002). This study was seeking to examine the causes (how and why questions) of resilience in food supply chains subjected to frequent disasters, the impact of resilience on these chains and also how the whole society can benefit. A significant advantage of case studies is that they are flexible and adaptable to change in the presence of new data and insights that could occur during the investigation (Saunders et al. 2011). This flexibility helped to investigate broadly the area of food supply chain resilience and as new insights unfolded, the researchers focused on areas demonstrating greater variability to the norms and hence discriminating.

Nevertheless, the case study methodology is not without its critics. This approach can be considered too situation specific and unable to generalize results (Weick and Kiesler 1979; Yin 1994). Also, it is time consuming and the extensive use of resources is also involved, such as researcher time. This later issue is of a major consideration to humanitarian logistics researchers as events often unfold/change with speed.

Regarding generalization, if the researcher has chosen a single case study with limited sample size, the results would hence not be significant in terms of statistical value (Alasuutari 2010; Ellram 1996). On the other hand, if large numbers of people are interviewed, then each would describe the complex phenomenon in a different way, which would make it difficult to interpret the situation correctly (Vissak 2010; Saunders et al. 2011). Indeed the purpose of the case study is to illuminate the detailed picture of a given phenomenon, and as suggested by Stake (1994) and Yin (2003), the expression *particularization* or *analytical generalization* should be used instead of generalization. Moreover, due to large amounts of qualitative data generated during the case study process, there may be the possibility that the researcher becomes overwhelmed and loses sight of actual issue in question or misses important larger themes altogether (Halinen and Törnroos 2005). Table 7.2 highlights the strengths and weaknesses of the case study method.

In response to some of these critiques, the case study methodology should be thoroughly designed *a priori*. 'Cases' then should be selected based on clear criteria and all the evidence of data collection should be well documented (Modell 2010). The 'unit of analysis' should be selected carefully and systematically (Gummesson 2007), and finally validity and reliability processes should be clear and give confidence as to the rigour of the research. For this study we address all these issues in the following sections.

Table 7.2 Strengths and limitations of a case study methodology

Strengths	Weaknesses
• It is commonly used in many scientific disciplines. • A higher response rate as compared to surveys. • Useful in generating new theory or explaining/criticizing already researched phenomenon. • Case study is very effective in explaining complex and dynamic issues in a real life context. • Very useful for asking 'why' and 'how' questions. It is also suitable to study organizations from multiple perspectives. • Theory development and empirical research can go side by side. • Flexible in the types of data that can be collected and analysed. • Flexible in reformulating and adding more questions during the data gathering process itself. • Provides rich descriptions of phenomenon.	• Sometimes case study is considered soft, weak and unscientific. • Less chances of getting published in certain journals, especially quantitative journals. • Case study is difficult and hard to conduct. • Interpreting the results can be confusing. • Requires more time as compared to other methodologies. Data analysis and write up are very labour intensive and need greater word length. • Interviewee may not be telling the full story; it is also difficult to get confidential data. • Researcher bias can be high in sample selection and interviews. • A greater chance of ending up with a weak theory. • It is really difficult to keep a balance between breadth and depth (single vs multiple case studies).

Adapted from Vissak (2010), Creswell (2013) and Yin (2014)

Case Study Design – Single and Multiple Cases

Given the nature of humanitarian logistics research outlined elsewhere in this handbook, and in light of above-mentioned specifications, it seems obvious that a case study methodology was the best approach for this research. This allows a deeper understanding of practical issues related to food supply networks in disasters in the real-life context of South Asian. What was of interest is the 'how' and 'why' of supply chain capabilities and processes that local food supply networks adopt in order to deal with natural disasters. This contemporary phenomenon was difficult to separate from its context, especially with the expected dynamics and interrelationships involved.

Further, it is essential to define what is a 'case' to understand case study design. The term 'case' in any case study is a construct, subject of interest and an empirical unit. Why it is important? Because scientific and practical interests are associated with it (Scholz and Tietje 2002). Eckstein (2000) defines a case as a phenomenon for which the researcher reports and

interprets only a single measure on any pertinent variable. The case could be an account of an event or problem or activity. A case can also be an individual, organization, society or a group of organizations (Yin 2014). Hence, we argue that a 'food supply chain' is a suitable case for this research. Hence, these chains become by default an empirical unit of analysis as a whole. We provide a discussion on the 'unit of analysis' in the following sections.

A single case study is selected when the research area is unique and similar case is not available (Scholz and Tietje 2002). However, this could be quite vulnerable if the case chosen turns out not to be the case which it was thought to be. Thus, Yin (2014) suggests that a multiple case study design be adopted to provide robustness to the work. Table 7.3 provides a comparison between single and multiple case study approaches.

It is considered that humanitarian researchers would be able to enjoy the choice of single or multiple cases as the number of actors, non-governmental

Table 7.3 Single versus multiple case studies

	Single case	Multiple cases
Typical Situation	One case When a case: • Is a critical case for the theory or theoretical propositions • Is an extreme or unusual case, deviating from everyday circumstances • Is a common case and where the objective is to capture the everyday situation • Is a revelatory or longitudinal case • Is used as a pilot case at the beginning of a multiple case study (Yin 2014)	Two or more cases (Yin 2014) When the researcher: • Is more concerned to explore differences within or across different cases • The goal is to replicate findings across different cases • Wants to reveal the complementary aspects of the phenomenon • When the aim is to develop rich, theoretical framework (Lewis-Beck et al. 2004; Kähkönen 2011)
Pros	• Rich description of the phenomenon • Require less time and resources	• Smaller researcher bias • Provide strong base to build the theory • Allow case comparisons to generate robust results • Enhance external validity
Cons	• Generalizability • The risk of exaggeration about the phenomenon • Chances of misinterpreting the representativeness.	• Time consuming • Less depth than single case • Require extra resources

Source: Authors.

organizations (NGOs), government organisation (GOs) and other agencies deployed into any relief effort is legion. If of course permissions are gained, indeed, there is an emerging trend of using the multiple case study approach and its ability to deal with a large amount of data from multiple sources (Easton 1995; Kähkönen 2011; Halinen and Törnroos 2005; Gummesson 2007). Multiple case studies have also proven to be a useful method among the researchers who study business supply networks (Batt and Purchase 2004). For this research example, a multiple case study method has been used to discover unique resilient approaches for each supply chain facing real-life disasters (floods and earthquakes). In particular, the multiple case approach facilitates cross-case comparisons and this is a very useful feature in humanitarian logistics (Coles, et al. 2012).

Yin (2014) has illustrated a useful approach to multiple case studies in Fig. 7.4 (below). The figure indicates that the first step is to generate a theoretical base from literature to guide the study. This is usually presented in form of a framework. It also reveals that case selection and protocol development are also important steps. Each individual case study should be considered as a 'whole' study. In each case, convergent evidence is sought regarding facts and conclusions. Each case conclusion is considered to be the information needing conformation/disconfirmation by the other cases. Both individual case and multiple case results should be the focus of final report. The report should also include a cross-case discussion that why certain results are found in one case study but has contrasting elements in other cases.

Case Selection and Unit of Analysis

In case study design, an important question which a researcher always encounters concerns the number of cases that is deemed sufficient? In qualitative studies this decision is discretionary, not formulaic, similarly with quantitative research and defining the 'significant effect' in experimental science. Thus, the confidence level of accepting or rejecting a null hypothesis based on the p-value ($p < 0.01$, $p < 0.05$, $p < 0.1$) is a discretionary judgment call by the researcher. Yin (2014) claims that if theory is straightforward, then two or three cases can be enough. However, if theory is more latent or subtle, then four to six replications will produce reliable results. Considering this, this research relies on a four case study design. As a consequence, Eisenhardt (1989) and Miles et al. (2013) suggest that the sample chosen for qualitative research should be *purposive*, one which serves the purpose of the study. As this research is focusing on food supply chain/networks in disasters, especially in the context

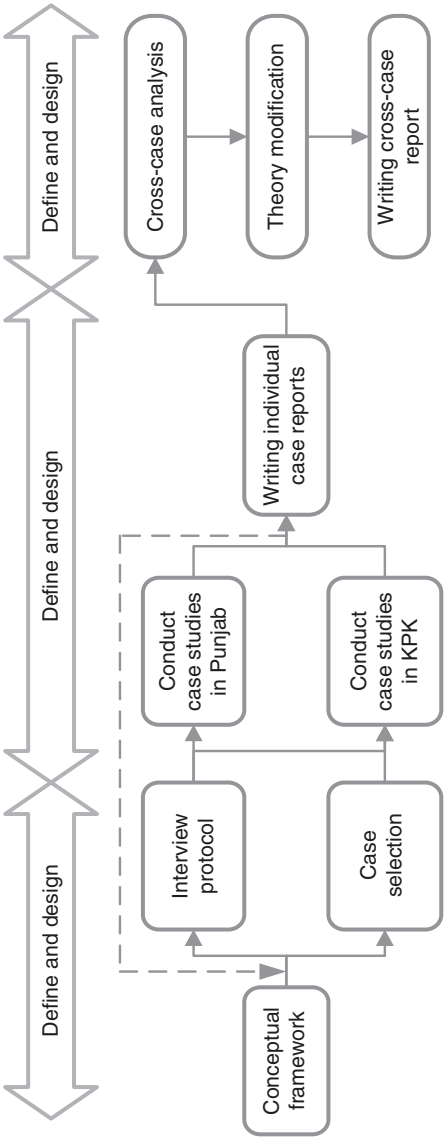

Fig. 7.4 Multiple case study procedure. Source: Adapted from Yin (2014)

of underdeveloped South Asian country, the first step was to find the areas where disasters occur frequently in Pakistan.

To help this selection the researchers contacted the National Disaster Management Authority (NDMA) of Pakistan who deals with the whole spectrum of disaster management activities in Pakistan (www.ndma.gov.pk), and also the South Asian Disaster Knowledge Network (WWW.SAARC-SADKN.ORG) which is a knowledge sharing platform among different stakeholders of SAARC (South Asian Association of Regional Cooperation) countries. From these discussions two regions that are vulnerable to disasters (and in fact have experienced these disasters frequently/annually) were purposively selected. The first area is the Punjab Province which is predominantly agricultural land. This area is badly affected by severe floods almost every year (Tariq and van de Giesen 2012). The second region is the Khyber Pakhtunkhwa (KPK) province which is vulnerable to earthquakes as well as floods (Khan et al, 2012) (Fig. 7.5).

Two cases from each region were selected to examine both intra- and inter-regional differences. Different relief food items were selected, which are usually provided by relief agencies (GOs and NGOs) to the community; these include rice, flour, oil, dry fruits, juice, water and food grains (Kovács and Spens 2007; Douglas 2009; Day et al. 2012; Whybark 2007). Given the research aim of seeing how local (commercial) food supply chains cope with parallel relief supply chains, we chose staple products (long shelf life) typically supplied in both channels in order to facilitate the comparisons.

However, the research was also interested in supply chains with products of a more perishable nature. Fresh fruit and vegetables supply chains are exceedingly susceptible to disasters in Pakistan. Fresh produce items are highly perishable commodities and during natural disaster, they become even more vulnerable to deterioration. Since the majority of the population in these areas is also dependent on continuous supply of fresh vegetables (Din et al. 2011; Ismail 2010), The research has also chosen a fresh produce supply chain in each region to study. Hence, the design is to study one staple and one fresh produce supply chain in each region, for a total of four case studies.

Another equally important task was to finalize the unit of analysis. Yin (2014) has suggested four basic design categories for case studies – single or multiple cases inspected from either a holistic point of view as a single unit of analysis, or they may be examined from embedded view with a multiple unit of analysis (see Fig. 7.6). Each supply network is comprised of a number of different organizations who work together to achieve the desired goals. Given that the aim is to understand resilience of a supply chain as a whole, it is

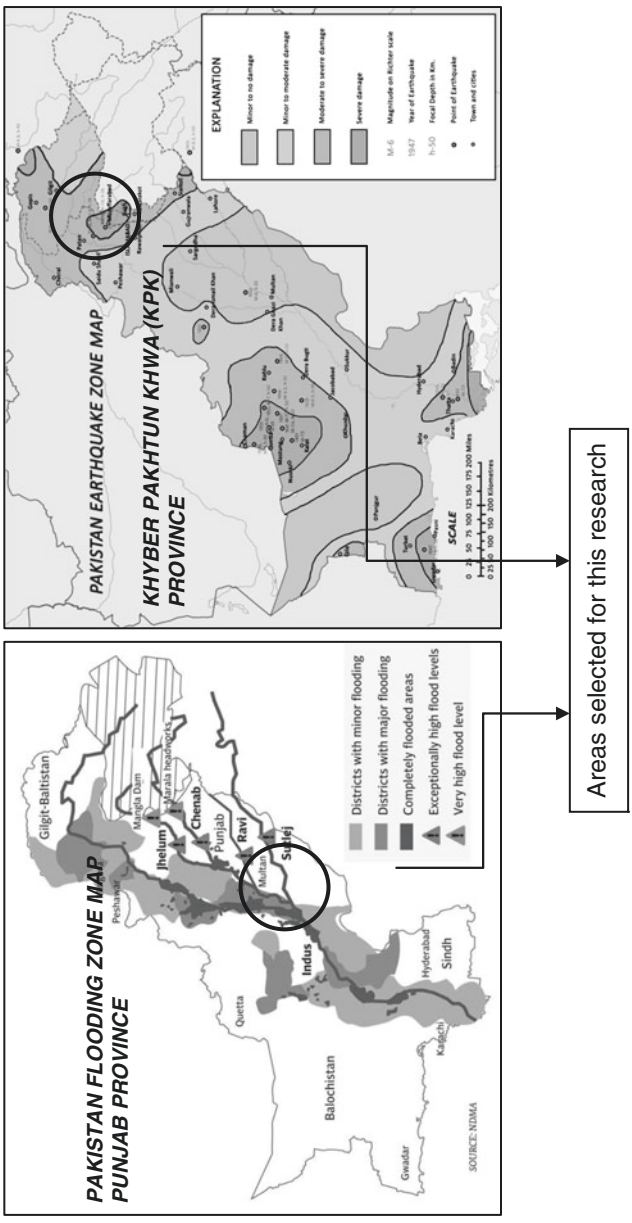

Fig. 7.5 Sample selection decisions – Flooding and earthquake zones in Pakistan. Source: NDMA and SADKN (May 2015)

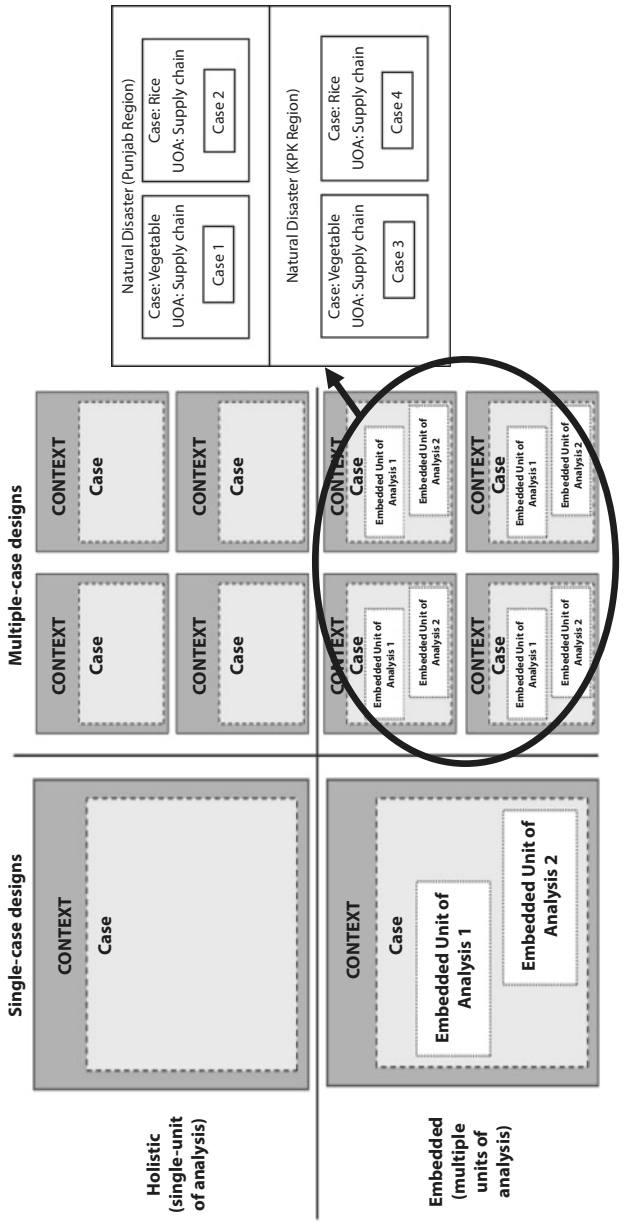

Fig. 7.6 Case study design and unit of analysis. Source: Adapted from Yin (2014)

necessary to investigate as many organizations as possible along the entire chain. Hence, the natural unit of analysis is the 'supply chain system' or 'supply network' that produces, and distributes the sampled products of rice and fresh produce. Every researcher will have to make these 'boundary'-type decisions at some stage. The key principle is to ensure that enough data points are captured to say something your unit of analysis (i.e. firm or supply chain), but not extending the boundaries to the point where data gathering becomes wholly impractical. Hence, this study has used multiple case study approach with an embedded perspective having the supply network as unit of analysis.

The Challenges of Network Research

Related to the unit of analysis decisions, there were three other major challenges involved in studying supply networks. As mentioned earlier, these are not mere four supply chains. Rather, each supply chain has multiple hierarchies involving hundreds of actors and suppliers, thus it can be argued that we are investigating a 'system' or complex network. It follows then that problems relating to network boundary, complexity and case comparisons were inevitable (Halinen and Törnroos 2005).

Case complexity was largely reduced by defining the number of cases and limiting the context to two main natural disasters (floods and earthquakes) as we excluded man-made and other types of disasters. Similarly, the site was limited to two main geographical regions in Pakistan that are vulnerable to these disasters. Complexity was also minimized with the help of a single interview protocol for all the respondents and by adhering to the research objectives at all times. The third important step was the selection of one staple food and one fresh produce supply chain within each region, hence resolving the issues related to case comparisons. Utilizing the same theoretical base and framework for all cases also facilitated the process of case comparison.

The major problem remaining was related to defining the boundaries of the networks, and this is similar to the issue of defining the unit of analysis. It is argued that the network boundary will clearly depend on the research problem. Halinen and Törnroos (1998) have proposed four ways of delimiting business networks (see Fig. 7.7). These four networks can be described as actor network, dyad network, micro-macro network and intranet network. As this study is concerned with food supply networks and was interested in taking a full view of the supply chain, the micro-macro network is a logical choice. At the macro level, these food networks

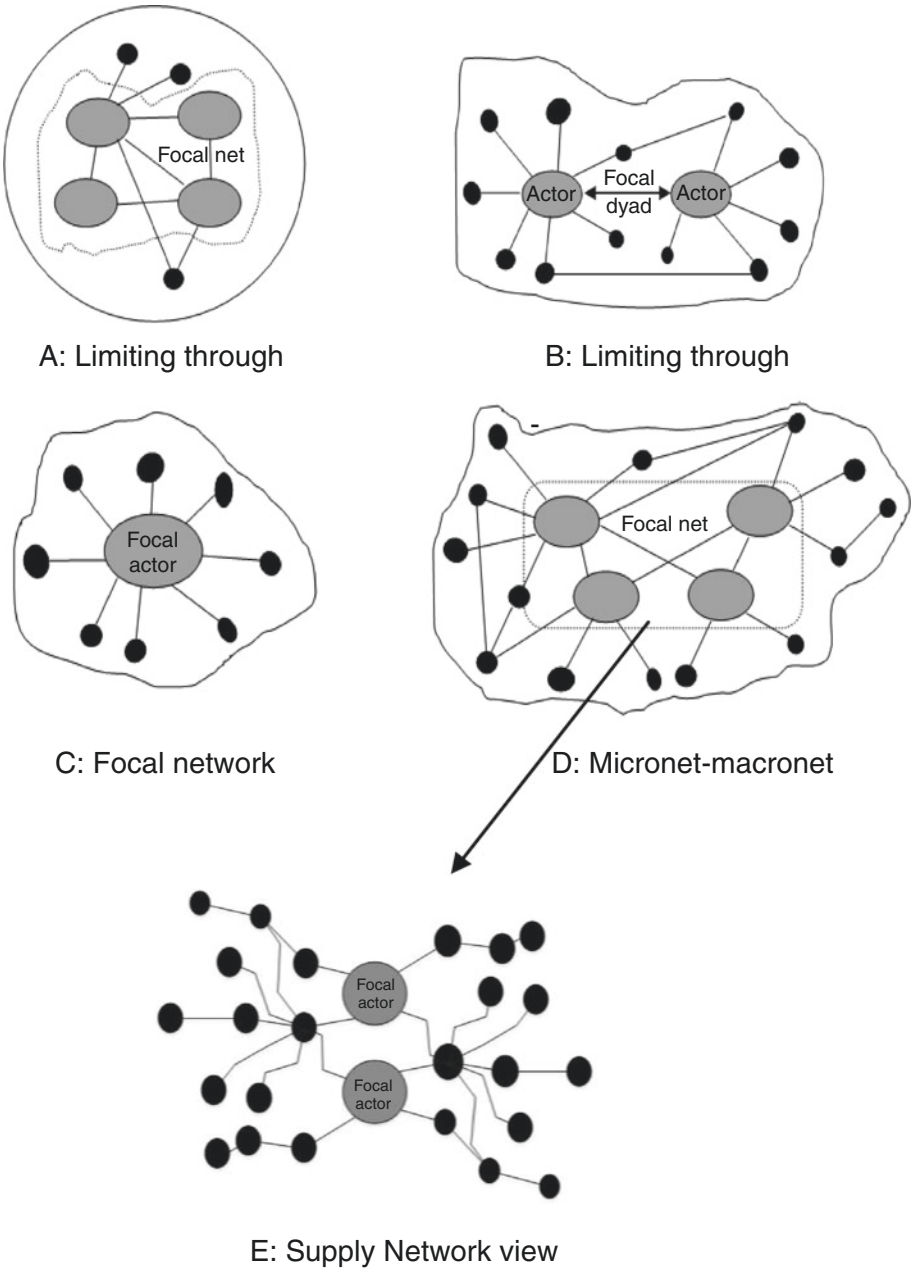

Fig. 7.7 Delimiting supply chain networks. Source: Adapted from Halinen and Törnroos (2005)

comprise thousands of actors such as different business units as well as government institutes, NGOs and humanitarian organizations. Within the micro network, the researcher approached the individual actors, thus asking them about their immediate important (dyadic) buyers and suppliers. The researcher then traversed through these referred buyers and suppliers until reaching the end of supply chain at both upstream and downstream ends. In this way the researcher was able to take a view of each buyer and supplier, as well as a horizontal view of actors at same level (tier) in the supply chain. However, there were number of challenges to reach to these actors as these networks are embedded in larger social and political networks. How the researcher reached the individual actors and the associated challenges in data collection will be discussed in the following sections.

Systematic Combining

One of the main features of theory generation from case studies is the numerous overlaps between data collection and data analysis (Strauss and Corbin 1990). This is called the 'matching process' or the 'systematic combining' approach (Dubois and Gadde 2002). They define matching as going back and forth between the case, framework, data collection and analysis (see Fig. 7.8). The way of achieving this matching is through direction and redirection of the study. This direction and redirection holds true for theory, cases and data sources. Hence, multiple data sources is one of the techniques to achieve this. Yin (2014) and Miles et al. (2013) argue that multiple sources are required to triangulate the data which in return increase the validity of the research. However, in systematic combining not only does it increase the validity, it also leads to the discovery of new phenomenon in the given context. As a result, these new discoveries compel the researcher to search for new theories to support the results and so on.

Reading what has been written so far would seem to make it appear that designing this research was a linear set of processes and decisions made sequentially. However, the truth is it is an intertwined research processes where the researcher has gone back and forth many times between theory and real world to ensure a rigorous research process. As qualitative research has been often criticized for lack of valid processes, the researcher has used a systematic combining (Fig. 7.8) approach as suggested above. This process permits iteration, meaning that the conceptual framework, theory, fieldwork

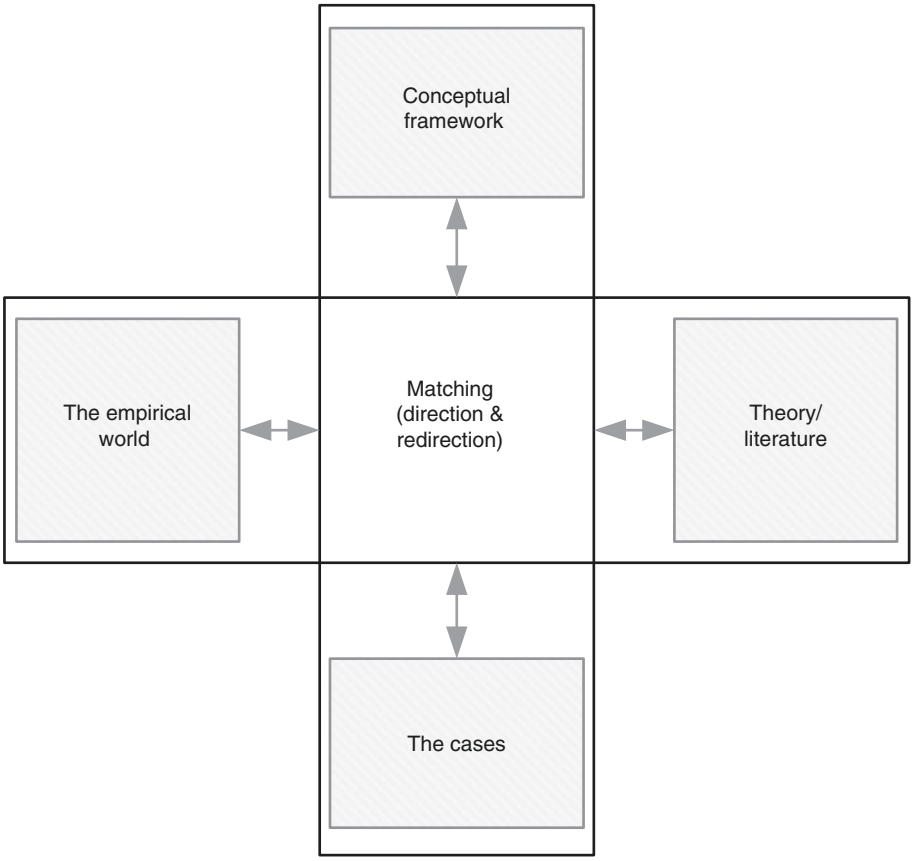

Fig. 7.8 Systematic combining. Source: Adapted from Dubois and Gadde (2002)

and case analysis develop at the same time. As the main objective of any research is to confront theory with the real world, therefore, systematic combining makes sure that this confrontation is continuous throughout the research. This does not however preclude a deductive approach also utilizing case studies as the method.

As such, the conceptual framework is very important in this approach. A conceptual framework is a graphical representation of the main concepts and their interrelationships. This framework is developed at the start of the study and then evolves gradually as the study progresses. It works as a general guideline of the main concepts that need to be studied in the empirical world (Miles et al. 2013). Once the researcher starts the data collection and with more grip on the relevant literature, the framework gets revised continuously and becomes more precise.

Following these guidelines, systematic combining occurred many times while continuously going back and forth between different aspects of this framework during the data gathering phase of this research. Initially, the researcher was focused on disaster management, which led towards humanitarian supply chains. A partial framework was also developed at the same time to effectively manage the supply chains in disruptive events. As part of this process, a full paper based on the literature review was presented at an international academic conference, which led the researcher to explore more emergent issues within this discipline. It was found that the little had been done with commercial food supply chains and disaster management. Hence, the researcher referred back to the literature where new themes emerged that resulted in a conceptual framework more tilted towards understanding the resilience of commercial chains, but adopting critical elements from the disaster management discipline. Initially the conceptual framework was a mixture of many concepts relating to the resilience of food supply chains. However, with regular meetings with the research committee and going back and forth in the theory, a number of concepts were merged and some were discarded. The new framework along with the theory was again presented at another international academic conference. It was also discussed with members of the Resilience Organization Research Group in Canterbury, New Zealand. The following sections will explain the full data collection process.

Sampling

This research, being qualitative in nature, used non-probability sampling to select the population for study. For this type of sampling, units are purposely selected to reflect specific features of interest in the population (Sekaran 2006). As this research was not seeking a sample that is statistically representative, we therefore *purposively* chose certain population characteristics for our selection criteria. A number of authors have recommended non-probability sampling for small-scale explorative studies (Miles, Huberman, and Saldaña 2013; Yin 2014; Sekaran 2006; Bhattacherjee 2012; Lewis-Beck et al. 2004). Purposive sampling technique identifies and selects those individuals/groups/organizations that are knowledgeable about the topic of interest or have experience in the field (Palinkas et al. 2015). Sample sizes were not fixed prior to the study as it depends on the resources, time available and theoretical saturation of the required study (Rubin and Rubin 2011). Therefore, it is more suitable for studies where analysis and data collection

goes side by side such as for this research. Using purposive sampling, organizations/commission agents in the fruit and vegetable and grain markets of Punjab and KPK regions were our initial point of contact. Internet and social media platforms were also used for this purpose as well as referrals from the Disaster Management Cell of the Pakistani Government. While selecting the initial informants, three criteria were used as guidelines: knowledgeable about the situation (had experienced some disaster or its effects in recent past), willing to talk and a diversity of views (big and small markets, different business situations, different areas).

While purposively selecting the initial sample, the referral or snow balling techniques were used to follow the supply chains of the four different cases. This was an effective way of finding the immediate supply chain actors as food supply chains within these regions are usually well connected. Each informant was asked about their *main* suppliers and buyers, therefore limiting the network to those more important actors and relationships (as described earlier). In this way those in the supply chain were traversed, thus rolling the 'snow ball' to each end of the chain. For time and travel constraints, the researcher selected the study units that were easily accessible. This may not always be an option for disaster studies. This form of sampling is sometimes called convenient sampling and is highly applicable for humanitarian researchers. Qualitative samples are usually small in size as there is no hard-and-fast rules to ensure sufficient scale to statistically prove the estimates, rather looking for richness in detail. Finally, this approach yielded 38 in-depth interviews that were conducted across the four food supply chains in Punjab and KPK region.

Data Collection

Interview Protocol Development

The prime source of data collection in case study research is typically in-depth interviews, backed up by observations, informal conversations and a review of archival secondary sources. Research protocols are necessary to enhance the validity and reliability of qualitative research (Yin 2014). A research protocol contains the introduction, rules, procedures, questions, themes and prompts used to help guide an interview. The interview questions are the main element of this instrument, pointing to specific data that is required. Question prompts are also included to help guide the conversation and also make sure that all the topics are covered during any interview.

The protocol also helps maintains the uniformity across all the interviews, thus increasing the reliability of the research (Voss et al. 2002).

In this study, the researcher used the 'funnel format' to structure the interview protocol. This protocol starts with the broader questions concerning the introduction, supply chain partners, buyers, logistics and business history. Then by funnelling down, the core questions relating to the preparation, response and recovery from recent disasters are asked. The main research questions were refined several times as more concepts were revealed through the literature. After the development of an initial draft protocol, the researcher tested the instrument on several knowledgeable people, in particular the Head of Department, Global Value Chains and Trade, Lincoln University, New Zealand and members of research committee of Resilient Organizations, Christchurch. The initial view was that it was very lengthy as it took almost 2 hours in one of the testing interviews. The instrument was further refined based on these comments, with redundant and unnecessary questions merged or removed and where necessary any ambiguity was clarified.

Protocol Language Translation

As the research setting was based in Pakistan where English is not common, the research instrument needed to be translated to the native language of the region (Urdu). This process was systematic involving two more researchers native to the same region and ethnic group. The instrument was independently translated word by word into the native language by these two researchers as well as the primary researcher. Google translate and other online dictionaries were used to help convert difficult words that have compatibility issues in both languages. The three translated versions were then reviewed in a combined meeting, thus leading to more changes in sentence structuring. The final drafted instrument was tested on a person of the same ethnic group and further refined. The last stage was to translate this instrument back to the English language to make the process valid. While minor inconsistencies were noted, the major themes and concepts remained intact in the back-translated English version.

Interviews

There are three main types of interviews that can be conducted in qualitative research. These are structured, semi-structured and unstructured (Saunders et al. 2011). Structured interviews use specific questions requiring specific

answers and a questionnaire (survey interview) and is a common tool. However, these interviews are most appropriate for quantitative studies (Whiting 2008). For this research semi-structured interviews were conducted. These types of interviews are more flexible, thus more suitable for the objectives of this research (exploratory). In a semi-structured interview, the researcher is able to follow lines of enquiry during the flow of the interview, but this demands more in-depth knowledge of the given topic. For this research, most of the interviews were individual one-to-one interviews; however, on several occasions group interviews were also conducted. The group interviews gave greater insights about the phenomenon capturing the collective experiences of people involved. Of interest were the notes and observations of the interpersonal interactions and reactions among the group being interviewed, thus revealing hidden meanings. Follow-up interviews were also conducted, with a number being conducted via telephone due to time and travel constraints.

In the data collection phase, the role of the interviewer was that of an investigator, who is looking for information and facts concerning the preparation, response and recovery phases of the disaster from the respondents. Leonard-Barton (1990), Yin (2003) and Creswell (2013) have all mentioned some qualities that a researcher should possess in order to conduct a good interview. These include good listening skills, unbiased, flexible and adaptable. In this particular research, some of the skills that really helped the researcher to gather quality data through the interviews are listed here:

- The researcher should be able to ask good questions and interpret the answers: these skills can be acquired by repeated rehearsals with the interview instrument.
- In order to interpret the answers, the researcher should have a full command of the local languages and culture. Some notions are culturally specific which can only be interpreted if you know the local customs. This is an important point for humanitarian researchers who typically operate in foreign environments and cultures.
- The researcher should be adaptable to the situation and be flexible. Newly developed situations should be seen as opportunities rather than threats, unless related to security and safety.
- Have full command of the subject area, but not be biased or have preconceived ideas, thus remaining sensitive to contradictory data.
- There is no need to impress the respondent with your knowledge of the subject

- Being an active and good listener is a key skill. Generally people are very sensitive to someone who is not giving them their full attention while they are talking.
- It is critical at first to develop a good rapport with the interviewee. Wear the same style of clothes and types of clothes for ethnic groups, use the same tone, maintain eye contact (if acceptable in that culture) and at all times be polite and humble.
- Always ask permission for before recording, and take any official documents with you to introduce yourself.
- Always allow the respondent the option to exit the interview at any time for any reason.

While conducting these interviews, the researcher has also noted the depth and detail, vivid and nuanced answers as well as rich content that can generate more themes (Rubin and Rubin 2011). Trust and paraphrasing questions in simpler ways were the key to achieving these characteristics. The general lack of trust and suspicion of people who ask questions was a major limiting factor within this society where the research took place. Potentially people and organizations were afraid of giving interviews for fear of some political or legal threat. Hence, good interview skills as mentioned before and social references were used to build trust. Much consideration should be given to the use of interpreters or locals where possible.

Qualitative data should be vivid and nuanced and this should emerge from one's questioning. Vividness comes through the step-by-step description of the event. The researcher enquired about the background of the respondents, their suppliers, buyers, logistic providers and any other actors involved to make the description of events fully vivid so that any reader would get a sense of not only the detail but the emotion as well. The researcher also asked for a detailed description of any meaningful moments that occurred in the recent disasters. For example, in one of the vegetable markets, the commission agent described an extreme flood which left the market completely submerged under water and silt, and then described how the market members self-organized and coordinated the clean-up and also the rationale for this behaviour. This was clearly a significant moment for the respondent and the emotion was evident. Researchers should not miss opportunities like these that allow unique moments to probe in depth.

Similarly, nuance implies that there could be several views/opinions/attitudes for the same phenomenon/event. Nuance requires a detailed description of something, not just a yes or no answer. For example, the researcher asked a question concerning trust from almost all the respondents,

if someone provided a closed answer such as 'yes, we trust our supplier', the researcher then asked further questions about the meaning of trust, such as how to achieve it. Everyone seems to have a different response to this question, hence providing a quite nuanced view of trust in this context. Finally, richness comes through extended conversations. The researcher encouraged the respondents to speak openly about each situation by asking probing questions (open-ended questions). As the researcher was familiar with the local culture and every culture has its norms, often the researcher would order a cup of tea or lunch for the respondents to show the intention of spending time with them and listening to more stories.

Secondary Data Gathering

Other than interviews, secondary data as well as data through direct observations were also collected. Observation is a more humanistic methodology and it involves the systematic recording and noting of occurrences, behaviours and processes in the social setting of the research, not just the words spoken (Marshall and Rossman 2014). In this research, observations were recorded during and before and after the interviews with different supply chain members, and also by visiting the markets where actual transactions take place. While a digital voice recorder was used to capture the words, photographs and field notes recorded the other non-verbal clues and captured actual observations of behaviours including the physical environment not described by the respondent.

Secondary data along with other methods help gain a holistic picture of the situation. Secondary data are invaluable because they helps triangulate the phenomenon under study by utilizing multiple sources of evidence. In this research, data related to the overall region's economic, social, technological and governmental situation was collected through governmental official reports and other published documents. Work process documents, handouts, receipts, transactional documents used by different actors, manuals, price lists and catalogues of items, farming brochures and reports, market manual, Punjab Disaster Management Authority (PDMA) research reports and other humanitarian company reports about the regional food supply chains were collected in the process. Triangulation is a critical component of any qualitative analysis to ensure validity and hence should be a feature of any humanitarian research project (Yin 2014).

The Data Gathering Phase

Data collection actually started long before the formal interviews for this research. In the period of December 2013 to March 2014, the researcher conducted a number of interviews with the emergency relief providers in Pakistan, in particular the NDMA and PDMA. The researcher wrote a formal letter to the managing directors of these organizations, seeking appointment for interviews. Hence, the procurement manager in NDMA and the managing director of the PDMA were interviewed. These interviews were unstructured in order to build an initial impression of disaster management in Pakistan, and how these agencies provide relief to the affected population. Through these interviews, an idea of the most vulnerable areas and people was revealed. These organizations also shared archival data and reports, which further clarified the overall conditions in these areas concerning natural disasters and response. It was from these interviews that the idea of looking at the resilience of commercial food supply chains in the advent of natural disasters was initially conceived. Following this, a literature review was conducted that resulted in the developing research questions and conceptual framework for this study.

Data collection related to four supply chains began at the start of October 2015 and was completed by the end of February 2016. Through the interviews with the above-mentioned organizations and researcher's own knowledge of situation, it was evident that the entry points for these supply chains would need to be the large wholesale markets where commission agents conduct their business. To illustrate how these agents work, Fig. 7.9 gives an overview of how connected these agents are in the supply chain; however, a detailed analysis of these markets will be contained in a future report. Agriculture is the main driver of Pakistan's internal economy. Just over 70% of the population is directly or indirectly engaged in farming, distribution, processing and production of major food commodities (Division 2011). Rice and wheat are the major crops of Pakistan, producing 24.5 and 6.7 million tonnes, respectively (Raza 2014). Similarly, Pakistan produces almost 9 million tonnes of fresh vegetable and fruits annually (Mehmood et al. 2010).

While a percentage of these food commodities are consumed at the farm level, for home consumption or sold directly to consumers from the farm gate, the vast bulk of the products passes through the wholesale market system to the end consumers. These wholesale markets are traditionally set up by the government and they have become a central node where sellers and buyers meet to execute transactions. Commission agents are basically

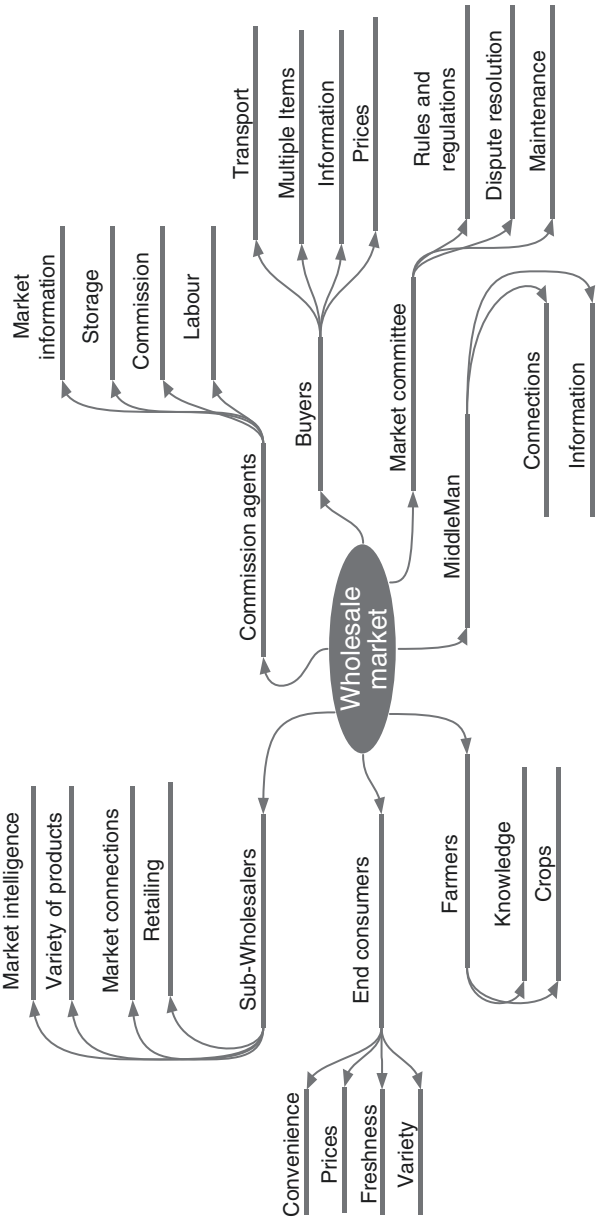

Fig. 7.9 Wholesale market components – Food supply chains in Pakistan. Source: Author

the main custodian of these markets as they are allocated shops/premises with the main markets. Therefore, the researcher first established contact with a number of these commission agents in order to enter into these supply chains. The Agriculture Market Information System (www.amis.pk) possesses a database of commission agents operating in different markets in Punjab region. Selection of these initial contacts was made utilizing the three criteria of purposive sampling mentioned earlier. From this list the researcher contacted some of the commission agents seeking information related to the research. Most of the agents were reluctant to be part of this due to a common cultural dilemma that people tend to avoid the strangers. However, two of the commission agents agreed to give face-to-face interviews. The one major success at this point was that commission agents' business was not attached to exclusively to a single supply chain. Rather every commission agent was usually involved in supply chains for multiple products. For example, an agent dealing with vegetables would also be involved in fruits. Similarly, wheat and rice are also traded by the same person/organization. Therefore, instead of calling these vegetable and rice supply chains, the researcher has described these as fresh produce and staple food supply chains as each product group has different logistics and market characteristics. Thereafter, the researcher made sure to interview the major businesses of each of these supply chains.

Meanwhile, the researcher used his extensive network of family, friends and social acquaintances to locate other entry points. Social media mainly Facebook and Twitter were also very helpful. The researcher updated his Facebook status about the research and asked for possible contributions from someone or help in finding further respondents. A number of social activists and people involved in disaster management were also contacted through Twitter. From this approach, important new contacts were generated in the KPK region and this assured entry points; similarly more contacts were found in Punjab region. During disaster events social media is one of the emerging and main information sources. Humanitarian researchers are encouraged to make more use of these somewhat untraditional sources of contacts and data.

In November 2015, after arriving at the research site, letters of introduction were written to PDMA and other government departments (City District Government Local Body) and requests for appointments made. The reasons for this approach were that during an initial interview one respondent explained that these institutes are part of the market committees and if someone from government accompanied the researcher then respondents would be more willing to speak.

Data Collection in Punjab Food Chains

The collection of data started by visiting one of the fruit and vegetable markets in Lahore city where the researcher made certain observations about the processes, loading and unloading of items, storage facilities and dealing with customers. A number of contacts were also made which showed interest in giving interviews. According to these observations, the interview protocol was further simplified in terms of language as the level of education of respondents was very low, making the questions around the key concepts hard to understand. Fortunately, the replies to some of the letters written to government officials were also very positive, and one of the officers (the district municipal officer in-charge of one of the largest fruit and vegetable markets in the region) agreed to assist in data collection. Being the key stakeholder, he was also interviewed. With his help, commission agents were contacted and interview times were set over the phone. The interviews were always conducted at their business sites. Initially two interviews were conducted with two separate commission agents and they also introduced their immediate suppliers and buyers. As this was the largest market in the region, farmers, middlemen and all other supply chain actors visit here regularly. Times and venues were then arranged to meet their supply chain partners.

Meanwhile, all the interviews were transcribed, and on the next visit were discussed with the actors for confirmation and accuracy. This particular supply network was spread all over Pakistan. Fresh items come not only from the immediate surrounding areas and region, but even from Sindh Province and KPK regions. The main suppliers and buyers who were in nearby areas were personally visited by the researcher to record the interviews. However, for suppliers from far away areas the researcher waited until they came to the market before being interviewed.

Being accompanied by the government officials made it easier to approach and be welcomed by these respondents. The downside was that it made it equally difficult to collect important information as these people were reluctant to provide sensitive information with officials being present. However, by sticking to best interview practices and using trust building techniques, the researcher was eventually able to gather the required information. Some of the respondents asked for an official letter from the hosting university/institution in order to assess the credentials of the researchers and the necessity of the research. Fortunately, this had been foreseen and such a letter had been obtained. It is highly recommended that researchers obtain

such a letter from their host university/organization confirming, purpose and use of this research and even enrolment before the field work.

Some of the products in this market came from the KPK region, which is also part of this research design. One of the wholesalers provided the contact for a farmer in this region, which later opened up new leads for this research in that region. The Facebook page provided contacts for two main supermarkets of the region, which mainly procure the items from this market. These contacts were actually previous students of the researcher who were working in these supermarkets supply chain departments.

Besides fresh produce, respondents from food supply networks for staples were also approached. Commission agents who were sampled from the agriculture marketing information system were contacted and appointments were made over the phone. During the interviews, the respondents were also asked to supply contact details of their key buyers and suppliers. One of the respondents who was interviewed came from a social media contact. This person invited the researcher into his home and later helped in a telephone interview with one of his main suppliers. The researcher then travelled with this person to rural areas from where farmers were interviewed. This person also gave the contact of one of his major buyers, a rice mill whose general manager was interviewed later on. Gaining the active support from locals such as this is invaluable in humanitarian research.

Most of these initial interviewees urged the researcher to visit the Kamoke grain market, which is one of the largest in Pakistan. Subsequently, the researcher interviewed a trader in rice who later turned out to be from the researcher's extended family. This person was purchasing rice from the same market and had contacts within the Kamoke market. In the last week of December 2015, the researcher travelled by road to this market where commission agents were interviewed, and then one of the middlemen accompanied the researcher to off sites to different local regions where rice mills, farmers and wholesalers were interviewed.

All the interviews were recorded with the permission of the respondents, and where respondents refused to be recorded (five respondents), handwritten notes were taken instead. The main source of data were these interviews; however, observations were made by repeatedly visiting this market and other small market in the region. The observations mainly recorded actions addressing the preparation for disaster, physical conditions, the interactions of these people with their suppliers and buyers and assessing logistics infrastructure such as transportation and storage facilities. Secondary data such as information sharing sheets, rate lists, tax documents, safety rules, newspaper articles and other reports written about these chains were also collected. All the

data were transcribed side by side during these interviews using '*Transcribe wreally*' (a web application). Audio files can be uploaded on this site and with the help of sophisticated tools, the transcription process becomes very easy. The transcripts were audited and checked by the researcher for accuracy.

Data Collection in KPK Food Chains

Gathering data in the KPK region was more challenging. Firstly because of the isolated geographical location and secondly the global war on terrorism has impacted heavily on the region. The researcher travelled to Peshawar the capital of this region by local transport. Before going there, a reference was obtained from the military so that movement in the region could be facilitated. In addition, people are friendlier towards military personal. Through Twitter, one person who was associated with a humanitarian organization was contacted and with his reference, the local fruit and vegetable market was visited. Initial interviews were recorded in the largest market of the region, and then through snowballing new contacts for farmers and buyers were obtained.

A number of contacts were also referred by the commission agents in Punjab; these were also interviewed. In this region people are more friendly and hospitable; however, because of the war on terror, they are afraid of talking to strangers. It was initially found that vegetable and fruit markets more or less operate in a similar fashion like Punjab region. On the contrary, food chains of staples are quite different. As all wheat and rice are cultivated in Punjab, this region provides all the staples for the KPK region. Therefore, in KPK there are large wholesale markets in different cities. All these wholesale markets obtain their supplies from Punjab and then distribute to the local areas. One of these big wholesale markets was visited by the researcher and recorded interviews where conducted. These wholesalers supplied further contacts with their key suppliers and buyers in different regions.

In the first week of January 2016, the researcher travelled further north of the region in a military vehicle and interviewed the respondents in local markets of Mardan, Batkhela, Mingora and Takht Bhai. Some of the farmers were interviewed via telephone as the roads were damaged due to the recent earthquake making access difficult. Some of the farmers who were selling their product directly on the road side were also interviewed. During these days, interviews were transcribed immediately and the transcripts were made and validated by the respondents. However, further interviews were required which were held via telephone.

In a similar manner, observations were made regarding the damage by the earthquake and rivers, transactions between different players, market structures and conditions, body languages, dealing with customers, transportation and storage conditions. Secondary data were also collected in shape of reports, rate lists, market committee rules and regulations.

Analysis

In qualitative studies, data analysis starts alongside the data collection. This technique helped the researcher to cycle back and forth between thinking about the existing data and coming up with new ideas to collect new data. This analysis is dependent on three contemporaneous steps: data condensation, data display and conclusion drawing (Miles et al. 2013). Data condensation is a process of focusing and simplifying the large quantities of data gathered from interviews, notes, documents and any other relevant sources. Coding, concept and theme generation are also part of this process. Data condensation in this research started with reviewing again the framework, research questions and data collection methods, thus condensing the overall information by selecting and focusing on the relevant knowledge derived from the theory framework. This process also compliments the systemic combining philosophy, where the framework, case study, collection methods and analysis evolve side by side. Concurrently, writing detailed case study descriptions and compiling matrixes to show the information is part of data display process. Data coding and themes generation are the most important steps in qualitative data analysis and these were done using NVivo software.

As recommended by Kvale and Brinkmann (2009), the written transcripts were shared with the respondents and feedback received. This process is important as it increases the internal validity. This interaction with the respondents helped generate more ideas and also strengthened the findings of the research. After the verification by the participants, all the data were then coded and concepts were grouped. Based on these codes and concepts, themes were generated and later triangulated against the observational and secondary data. Queries were then run in NVivo software to display the data, and finally these data were compared with the literature and theory to generate the conclusions.

The coding of the data is a complex process. Even from a small paragraph, a good number of codes and concepts can be emerged. The development of codes, categories and themes in the NVivo software was accomplished by a

four-step process as suggested by Silver and Lewins (2014), being organizing the data, data exploration, data integration and finally interpretation. Additionally, a number of other general approaches to coding suggested by other authors were trailed (Yin 2014; Miles et al. 2013; Saldaña 2015; Hesse-Biber and Leavy 2010).

In this whole data interrogation process, the first step is to 'organize the data'. In this phase, familiarization with the data is the objective. Interview transcripts were read, re-read, grouped and notes were reviewed. Similarly, secondary data were organized, and referral to the literature base was made for more insights. Furthermore, data were sorted and an interpretative framework was also built.

The interview transcripts were imported into NVivo in the source section. Then the files were copied into the internal section and arranged into four separate folders to accommodate the four separate supply chains studied. Relevant secondary data were also copied here. In the memos section, all the observations were saved. Pictures related to the each site were also brought into the internal folder of this sources section in NVivo.

The next step was developing the interpretative framework. This should be done according to the research questions and/or the conceptual framework. In NVivo, this step is known as generating the initial 'nodes'. Nodes are basically the container in which similarly linked data/ideas are kept in order to generate themes and running queries. It also assists with displaying the data graphically (visualizations). These initial nodes were generated according to the sections in the conceptual framework of this study. For our research, these main nodes were initially vulnerabilities, capabilities, resilience and outcomes. Within these initial containers, further 'child' containers were generated according to pre-coding codes. These pre-coding codes were drawn from the literature. The reason for these child containers is that in using an inductive methodology, this research started with *a priori* theory and hence initial concepts of interest. Further codes were then generated and the initial codes were then merged or expanded based on the degree of similarity or variance.

Simultaneously, the 'classifications section' in the NVivo was used to classify the sources of data according to the different supply chain actors being interviewed. Initial coding was also done in this step. The automatic coding function of NVivo was not used here, as the researcher wanted to code the whole data manually in order to become more familiar with the contents. This process, while more time consuming, was very helpful in developing a clearer picture of how data were 'talking' and the themes started to originate even from this first round of coding.

The second step in this data interrogation is 'exploration'. Here, codes developed in first phase are transformed into concepts based on resemblances and distinctions. Also, less important or orphaned codes are subsumed into higher order codes. Codes and concepts are marked and annotated as well using the annotated tools available in NVivo. The third step is 'integration'. Here codes and categories are connected together and this then generates the patterns. These patterns were carefully observed, and based on these patterns and integration of other sources of information such as observation and literature, 'categories' are developed.

In the fourth step, 'interpretation' queries are run to see the comparison and other data display tools are used to make connections among different categories. Only then can the final report be written. We suggest that the report be written at two levels: descriptive and interpretative. The descriptive level narrates the whole supply chain and all the relevant stories told by the respondents. Often the descriptive part of the case study analysis is appended at the back of the report as an attachment or appendix. The interpretative part of the case study is by far the most important section and reveals the themes and connection of these themes to resilience of supply chain. This section will take time and effort to ensure that the analysis is unbiased and as accurate as possible. Data visualization diagrams and tables are helpful here to finally tell the story.

Assessment Criteria

Producing reliable and rigorous research is essential for decision making but challenging in the humanitarian logistics context. As such reliability and generalizability are key assessment criteria for assessing the quality of any research. Nonetheless, these two assessment criteria are generally related to the positivist or quantitative approach (Yin 2014). As this research is more interpretive in nature, these measures need to be expressed in a different way. This study intended to study a contemporary phenomenon and other than generalizing the findings to the specific context, the interpretation and explanation of the events are the main concern (Alasuutari 2010).

Qualitative studies cannot generally be replicated as the real world is constantly changing. This is contrasted to a laboratory experiment where repeatability (reliability) is critical. Each interpretation is unique and hence replication is not as relevant in these types of studies (Strauss and Corbin 1990; Marshall and Rossman 2014; Yin 2014). On the contrary,

'authenticity' and 'internal validity' are the focal issues for qualitative research. Additionally, qualitative research is concerned about matching the findings with the reality (Patton 2005).

To summarize, Lincoln and Guba (2000) asserts that qualitative interpretations can be improved by four factors: credibility, dependability, transferability and conformability. Table 7.4 explains the steps taken to improve the quality of this study.

Table 7.4 Measures of reliability and validity in qualitative research

Criteria	Steps taken
Credibility (internal validity) Credibility establishes the extent to which the research finding is true interpretation of participant's original views.	a) Prolonged engagement in the field: research was familiar with the local culture and also contacts were established with respondents long before the data collection stage. b) Multiple case studies were used in the study, which is well established and backed by multiple recognized researchers in the field. c) Data triangulation was employed. This strategy made it easy to cross check the findings with different data sources. For example, data from interviews were triangulated with observations and secondary data. d) Respondents were given full opportunity to withdraw from the study anytime. Only genuinely interested respondents were chosen to collect the data. e) Peer debriefing: researcher has continuously taken support and feedback from the peers. Researcher attended seminars and conferences to take suggestions. Researcher was also part of Resilient Organization, New Zealand, which provided support during this whole study.
Dependability (reliability) It refers to the stability of results over time.	a) Detailed interview protocol was prepared to collect the data. This protocol includes the description of the research, concise questions about the phenomenon and has the complete list of prompt questions asked during the process. This can help future researchers to be able to follow same procedures to get similar results.
Transferability (external validity) The level to which results from one case study or real world can be applied to other case study in some different context.	a) Provide thick description: Thick and detailed description is provided for each case study as well as the setting/context with in which this case study was embedded. b) Multiple case studies are done in similar conditions which further enhance the transferability of this study. c) Purposeful sampling was used and it helped the researcher to stay focus on the key informants. It helped the researcher in in-depth findings.

Table 7.4 (continued)

Criteria	Steps taken
Conformability (objectivity) It refers to the degree to which results from one case study can be confirmed by other researchers.	a) Full details of the participants were collected in the process. Participants were also given chance to ready and give feedback on the transcripts. Similarly, the interpretation chapters also include the quotes from the participants' interviews.

Source: Adapted from Lincoln and Guba (2000).

Final Advice for Field Work Researchers in South Asia

We conclude this chapter with a brief summary of the lessons learnt and the limitations while the researcher was conducting the data gathering phase in South Asia. We hope that the information provided in this chapter will help all researchers deal with qualitative case study-type research in general, but for humanitarian and disaster relief researchers in particular. This type of research seems to be the most commonly published in the discipline; hence, it is critical to get it as accurate as possible.

Local knowledge of culture, area and accustoms are the key areas to be focused on before actually going into the field. Without the local language, it is difficult to communicate with the different supply chain actors. In this research, most of the respondents could only speak Punjabi and Urdu in the Punjab area, and similarly in KPK region with the addition of Pushto as a widely spoken language. It is highly desirable to have the local interpreter along with you who can translate the important insights on the spot. Secondly, it is very hard to distinguish between different food supply chains in the region as most people are trading and doing business across multiple food items. Similarly, different supply chain players are hard to distinguish based on their roles, for example, the same firm behaves as a supplier and other times as the buyer. This is especially true given the micronature of many of the businesses where the respondents have to perform multiple roles. Therefore, the researcher has to have local acumen to figure out these confusions.

A time limit was another constraint on this research. These supply chains are very fragmented and geographically spread in this region. Sometimes many kilometres have to be travelled between interviews. Therefore, researchers should allow ample time to spend in the region to collect the required data. Do not rely

on the local public transport system as it is barely functional and the vehicles are not in good (safe) condition, hence one's own transport is a must.

Another interesting point that can confound the analysis is the frequency of the disasters. Some of the disasters, like floods in the Punjab region, are so frequent that the local population have become very blasé about these events and find it hard to differentiate these events from 'normal'. Thus, researchers in this field have to define what is a disaster before conducting the interviews. This should differ for humanitarian researchers in a sudden-onset disaster situation where the event is hard to miss and is certainly not normal. In this field work, researchers should differentiate those events that are 'normal' and those that are severe and have resulted in a catastrophe. Otherwise they will have to face the situation in which people will talk normally about a disaster and nothing might have changed from their business as usual (BAU) situation. Some other points worth noting are mentioned below:

- Always maintain a confidence in yourself and your research. The supply chains and business models in this research area are very disorientating and so informally connected to each other that it is very difficult to define roles and boundaries. This can be overwhelming at times. In reality, they have similar processes and problems like that of any organized business.
- Have a good knowledge of local area; first, the culture, customs, transport, road conditions and language.
- Safety first: some areas are highly vulnerable to the war on terror and other tribal conflicts, always use an escort from law enforcing authorities and/or be accompanied someone from the local area.
- People are usually very friendly, but they are afraid of or reluctant to talk to strangers because of the trust issues. Approach them through some common friend or some trustworthy government official to win their trust.
- Give yourself plenty of time because you might have to approach a targeted respondent multiple times in order to obtain accurate information.
- Start the analysis process very early in the data collection phase; this will help generating more ideas and lines of enquiry as well as validate the data concurrently.

This chapter has examined the application of the case study method to field research in a humanitarian logistics context. The main focus was to reflect on the use and application of the case method when examining food supply chains in disaster-affected regions of a developing economy. The results of the analysis

will be presented at a future date. We hope that the extended discussion on the steps, process and application of the case method to our research will be of use to PhD students and humanitarian logistics researchers.

References

Agarwal, Renu, and Preethi Subramani. 2013. 'Opportunities and pitfalls associated with coordination structures in supply chain management: An exploratory case study'. *International Journal of Supply Chain Management* 2 (4):17–31.

Alasuutari, Pertti. 2010. 'The rise and relevance of qualitative research'. *International Journal of Social Research Methodology* 13 (2):139–155.

Batt, Peter J., and Sharon Purchase. 2004. 'Managing collaboration within networks and relationships'. *Industrial Marketing Management* 33 (3):169–174.

Bhattacherjee, Anol. 2012. *Social science research: Principles, methods, and practices*. Textbooks Collection. Book 3.http://scholarcommons.usf.edu/oa_textbooks/3.

Bozkurt, Melda, and Serhan Duran. 2012. 'Effects of natural disaster trends: A case study for expanding the pre-positioning network of CARE International'. *International Journal of Environmental Research and Public Health* 9 (8):2863–2874.

Christopher, Martin, and Helen Peck. 2004. 'Building the resilient supply chain'. *International Journal of Logistics Management* 15 (2):1–14.

Coles, John B., Jun Zhuang, and Justin Yates. 2012. 'Case study in disaster relief: A descriptive analysis of agency partnerships in the aftermath of the January 12th, 2010 Haitian earthquake'. *Socio-Economic Planning Sciences* 46 (1):67–77.

Creswell, John W. 2013. *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, California: Sage Publications.

Day, Jamison M., Steven A. Melnyk, Paul D. Larson, Edward W. Davis, and D. Clay Whybark. 2012. 'Humanitarian and disaster relief supply chains: A matter of life and death'. *Journal of Supply Chain Management* 48 (2):21–36.

Din, Ahmad, Saima Parveen, Muhammad Azher Ali, and Abdus Salam. 2011. 'Safety issues in fresh fruits and vegetables-A review'. *Pakistan Journal of Food Sciences* 21 (1–4):1–6.

Division, Statistics. 2011. *Agricultural Statistics of Pakistan*. Edited by Pakistan Bureau of Statistics, Government of Pakistan.

Douglas, Ian. 2009. 'Climate change, flooding and food security in south Asia'. *Food Security* 1 (2):127–136.

Dubois, Anna, and Lars-Erik Gadde. 2002. 'Systematic combining: An abductive approach to case research'. *Journal of Business Research* 55 (7):553–560.

Easton, Geoff. 1995. 'Case research as a methodology for industrial networks: A realist apologia. In *IMP Conference (11th): Interaction, Relationships and Networks: Past - Present - Future*, edited by Turnbull, P. W., Yorke, D., and Naudé, P. Manchester: Manchester Federal School of Business and Management. IMP; 7–9 Sep.

Eckstein, Harry. 2000. 'Case study and theory in political science'. *Case Study Method*: 119–164.

Eisenhardt, Kathleen M. 1989. 'Building theories from case study research'. *Academy of Management Review* 14 (4):532–550.

Ellram, Lisa M. 1996. 'The use of case study method in logistics reserach' *Journal of Business Logistics* 17 (2):93–138.

Glaser, B. Strauss, and Anselm Strauss. 1967. *The discovery of grounded theory*. New york.

Gummesson, Evert. 2007. 'Case study research and network theory: Birds of a feather'. *Qualitative Research in Organizations and Management: An International Journal* 2 (3):226–248. doi: doi:10.1108/17465640710835373.

Halinen, Aino, and Jan-Åke Törnroos. 1998. 'The role of embeddedness in the evolution of business networks'. *Scandinavian Journal of Management* 14 (3):187–205.

Halinen, Aino, and Jan-Åke Törnroos. 2005. 'Using case methods in the study of contemporary business networks'. *Journal of Business Research* 58 (9):1285–1297.

Hesse-Biber, Sharlene Nagy, and Patricia Leavy. 2010. *The practice of qualitative reserach*. Thousand Oaks, California: Sage Publishing.

Ismail, Ali. 2010. Pakistan floods unleash desperate economic crisis. Accessed 9 May 2015.

Järvensivu, Timo, and Jan-Åke Törnroos. 2010. 'Case study research with moderate constructionism: Conceptualization and practical illustration.' *Industrial Marketing Management* 39 (1): 100–108.

Johnsen, Thomas. 2011. 'Innovation through supply relationships, chains and networks.' Université de Grenoble.

Kähkönen, Anni-Kaisa. 2011. 'Conducting a case study in supply management.' *Operations and Supply Chain Management* 4 (1):31–41.

Khan, Shuhab D., Lize Chen, Sajjad Ahmad, Irshad Ahmad, and Fayaz Ali. 2012. 'Lateral structural variation along the Kalabagh Fault Zone, NW Himalayan foreland fold-and-thrust belt, Pakistan'. *Journal of Asian Earth Sciences* 50:79–87.

Kneafsey, Moya, Laura Venn, Ulrich Schmutz, Bálint Balázs, Liz Trenchard, Trish Eyden-Wood, Elizabeth Bos, Gemma Sutton, and Matthew Blackett. 2013. Short Food Supply Chains and Local Food Systems in the EU. A State of Play of their Socio-Economic Characteristics. Institute for Prospective and Technological Studies, Joint Research Centre.

Kovács, Gyöngyi, and Karen M. Spens. 2007. 'Humanitarian logistics in disaster relief operations'. *International Journal of Physical Distribution & Logistics Management* 37 (2):99–114.

Kvale, Steinar, and Svend Brinkmann. 2009. *Interviews: Learning the craft of qualitative research interviewing*. Los Angeles: Sage Publications.

Lee, H. L. 2004. The Triple-A supply chain, *Harvard Business Review, 82* (10):102–112.

Leonard-Barton, Dorothy. 1990. 'A dual methodology for case studies: Synergistic use of a longitudinal single site with replicated multiple sites'. *Organization Science* 1 (3):248–266.

Lewis-Beck, Michael, Alan E. Bryman, and Tim Futing Liao. (Eds.). 2004. *The Sage encyclopedia of social science research methods*. Thousand Oaks, California: Sage Publishing.

Lincoln, Yvonna S., and Egon G. Guba. 2000. 'The only generalization is: There is no generalization'. *Case Study Method*:27–44.

Marshall, Catherine, and Gretchen B. Rossman. 2014. *Designing qualitative research*. (6th Ed.). Thousand Oaks, California: Sage Publications.

Mehmood, Waqas, Yasir Liaqat, Nauman Iftikhar, and Syed Hassan Raza. 2010. 'Managing supply chain risks in fresh food items: A case study on Makro-Habib Pakistan Limited – A wholesales chain in Pakistan'.

Meredith, Jack. 1998. 'Building operations management theory through case and field research'. *Journal of Operations Management* 16 (4):441–454.

Miles, Matthew B. and A. Michael Huberman, 1994. *Qualitative data analysis: An expanded sourcebook*, (2nd Ed.). Thousand Oakes, California: Sage Publications.

Miles, Matthew B., A. Michael Huberman, and Johnny Saldaña. 2013. *Qualitative data analysis: A methods sourcebook*, (3rd Ed.). Thousand Oaks, California: Sage Publications.

Modell, Sven. 2010. 'Bridging the paradigm divide in management accounting research: The role of mixed methods approaches'. *Management Accounting Research* 21 (2):124–129.

Palinkas, Lawrence A., Sarah M. Horwitz, Carla A. Green, Jennifer P. Wisdom, Naihua Duan, and Kimberly Hoagwood. 2015. 'Purposeful sampling for qualitative data collection and analysis in mixed method implementation research'. *Administration and Policy in Mental Health and Mental Health Services Research* 42 (5):533–544.

Patton, Michael Quinn. 2005. *Qualitative research*. Wiley Online Library, doi: 10.1002/0470013192.bsa514.

Peck, Helen. 2005. 'Drivers of supply chain vulnerability: An integrated framework.' *International Journal of Physical Distribution & Logistics Management* 35 (4):210–232.

Ponomarov, Serhiy, and Mary C. Holcomb. 2009. 'Understanding the concept of supply chain resilience'. *International Journal of Logistics Management* 20 (1):124–143.

Raza, Asmat. 2014. *Pakistan grain and feed annual report 2014*. Report prepared for the USDA Foreign Agricultural Service, Global Agricultural Information Network, Clay Hamilton (Ed.). Retrieved 3 Oct 2016 from: https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Islamabad_Pakistan_3-31-2014.pdf.

Robson, Colin. 2002. Real World Research, 2nd Edn. Malden: Blackwell Publishing.

Rubin, Herbert J., and Irene S. Rubin. 2011. *Qualitative interviewing: The art of hearing data*. Sage.

Saldaña, Johnny. 2015. *The coding manual for qualitative researchers*. Sage.

Saunders, Mark N. K., Mark Saunders, Philip Lewis, and Adrian Thornhill. 2011. *Research methods for business students, 5/e*. Pearson Education India.

Scholz, Roland W., and Olaf Tietje. 2002. 'Embedded case study methods'. *Integrating Quantitative and Qualitative*.

Sekaran, Uma. 2006. *Research methods for business: A skill building approach*. John Wiley & Sons.

Silver, Christina, and Ann Lewins. 2014. *Using software in qualitative research: A step-by-step guide*. Sage.

Stake, RE. 1994. Case studies. InN. K. Denzin & YS Lincoln (Eds.), *Handbook of qualitative research* (pp. 236–247). Thousand Oaks, CA: Sage.

Strauss, Anselm, and Juliet Corbin. 1990. *Basics of qualitative research*. Vol. 15. Newbury Park, CA: Sage.

Tariq, Muhammad Atiq Ur Rehman, and Nick van de Giesen. 2012. 'Floods and flood management in Pakistan'. *Physics and Chemistry of the Earth, Parts A/B/C* 47:11–20.

VanWynsberghe, Rob, and Samia Khan. 2008. 'Redefining case study'. *International Journal of Qualitative Methods* 6 (2):80–94.

Vissak, Tiia. 2010. 'Recommendations for using the case study method in international business research'. *The Qualitative Report* 15 (2):370–388.

Voss, Chris, Nikos Tsikriktsis, and Mark Frohlich. 2002. 'Case research in operations management'. *International Journal of Operations & Production Management* 22 (2):195–219.

Weick, Karl E., and Charles A. Kiesler. 1979. *The social psychology of organizing*, Vol. 2. New York: Random House.

Whiting, Lisa S. 2008. 'Semi-structured interviews: Guidance for novice researchers'. *Nursing Standard* 22 (23):35–40.

Whybark, D. Clay. 2007. 'Issues in managing disaster relief inventories'. *International Journal of Production Economics* 108 (1):228–235.

Yin, Robert. 1994. *Case study research: Design and methods*. Beverly Hills, California: Sage Publications.

Yin, Robert. 2003. *Case study research: Design and methods*, (3rd Ed.). Thousand Oaks, California: Sage Publications.
Yin, Robert. 2014. *Case study research: Design and methods* (5th Ed.). Thousand Oaks, California: Sage Publications.