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**Corporate advisory networks of
knowledge sharing agents**

by

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A dissertation submitted in fulfilment for the Degree
of



Faculty of Management
UNIVERSITY OF JOHANNESBURG

Supervisor: Prof Tanya du Plessis

MARCH 2014

Declaration

I certify that the minor dissertation submitted by me for the degree Master's of Philosophy (Information Management) at the University of Johannesburg is my independent work and has not been submitted by me for a degree at another university.

Evthemia Stavri

(Name in block letters – no signature)



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Abstract

This study was aimed at the discovery of key employees in corporate advisory networks who act as agents to share information and knowledge.

In the current competitive and often uncertain economic business environment, savvy executives need to leverage off the expertise of their company employees in order to service their customers effectively and remain competitive. Since not all employees in the company have expert knowledge, executives need to discover the advisory networks of expert employees embedded in formal organisational structures and encourage them to share and transfer their expert knowledge to novices and/or less experienced employees.

In light of the current argument, a diagnostic technique known as social network analysis (SNA) was used to map out and measure the advisory relational X-ray patterns within organisational departments and across to other functional business units. Once the patterns are discovered and the key expert networked employees identified, knowledge sharing interventions are introduced to facilitate experts to share and transfer their information, knowledge, insights and experiences to other less knowledgeable employees within the departments and across to other functional areas in the organisation. The overall objective of this study is therefore to utilise the SNA technique to discover the experts in the corporate advisory networks whom will act as agents to facilitate information and knowledge sharing in the organisation to improve other employees' work performance thereby enabling the organisation to meet and even exceed its strategic objectives.

This study provided an overview of the literature review findings as well as empirical research evidence with regard to what the SNA methodology entails in a corporate environment; how the SNA technique discovers the advisory networks, expert employees and communicational knowledge flows; and how the subsequent

analysis and results of the SNA technique can be used to facilitate and ignite knowledge sharing interventions in the corporate environment.

This study aimed to serve as a foundation from which "The Company" under investigation could build a knowledge sharing intervention strategy to improve its overall organisational performance.

Key words: corporate advisory networks; social networks; social network analysis; SNA; organisational network analysis; knowledge sharing.



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Glossary

- Actor** Those people who have depth and understanding in a particular area in the network (also known as network players)
- Adjacency matrix**..... A square matrix consisting of zeros and ones; each pair of adjacent actors in the network is either connected or not
- AAR(s)**..... After action review(s) method used to evaluate the lessons learned by team members from their past successes and failures on work activities that have been completed
- Asymmetric tie** One-way tie from actor [A] to actor [B], for example, [A] gives advice to [B]
- Broker** A node that connects two sub-networks
- Central connector**..... Centrality of an actor is the extent to which an actor occupies a central position in the network
- Clique**..... A group in which all actors interact reciprocally with each other but have no common links to anyone else
- CoP(s)** Community of practice or communities of practice are groups of people who have a mutual interest in a topic and regularly engage in sharing and learning based on their common interests or methods of working
- Cutpoint** An actor whose removal from the network results in sub-sets of actors between whom there is no connection
- Degree centrality** The number of connections that an actor has in the network; in-degree centrality refers to the number of people who asks the actor for advice and out-degree centrality is the number of people the actor gives advice to
- Density** The number of ties in the network divided by the maximum number of tie that is possible
- Dyad**..... Two actors connected by a tie
- Ego**..... Central actor
- Egocentric network** The social network around the ego (central actor), including ego's direct ties

Isolate	An actor that is not connected to any other actor in the network
Network	Relationships between people
ONA	Organisational network analysis technique used to help corporate leaders assess the patterns of informal networks among employees, teams, functions and organisations
Peripheral player	Actor linked on the periphery of the network or a complete isolate who does not interact; structural position on the outskirts of a network
Reciprocal	Also known as symmetry; if actor [A] has a tie with actor [B], that tie will be reciprocated by [B]
SNA	Social network analysis is the technique of mapping out the informal relationships and analysing relationships among people, teams, departments, business units or even the entire organisation
Triad	Three actors connected to each with ties that are either reciprocal, non-reciprocal and/or mix of reciprocal and non-reciprocal
Whole network	The complete set of ties among all actors in the network

List of abbreviations

AAR(s)	after action review(s)
cf	confer, compare with
CoP(s).....	community/communities of practice
IT.....	information technology
KM	knowledge management
ONA	organisational network analysis
SBU(s)	strategic business unit(s)
SECI	socialisation, externalisation, combination and internalisation
SME(s).....	subject matter expert(s)
SNA	social network analysis

Chapter 1

Introduction to the research problem and its context

1.1 Background

This study is focused on the discovery of corporate advisory networks of employees who act as agents for sharing information and knowledge. An organisation's strength is spread across its people, processes, and technologies. While a significant effort is directed at improving efficiency of the processes and technology, an organisation or company must also tap the value that resides in the organisation's 'human capital'. Prescott and Miller (2001:176) describe human capital as the people, the network of relationships and the knowledge embedded in those networks. A company or organisation in society is therefore viewed as a system of objects of people or groups of people who are joined together by a variety of relationships (Tichy, Tushman & Fombrun, 1979:507).

Anklam (2007:13) further asserts the concept of the importance of 'people' in organisations, by citing two examples. The first example refers to an article published in January 2006 in the Economist, where it is stated that a new generation of worker is born known as the 'networked person'. The network person is a person who makes decisions based on human interactions and is happiest when managing work on complex interdependent tasks. The second example refers to a McKinsey report of 2006 that studies the nature of work and the shift towards tacit interactions. Tacit interactions require workers to articulate what they know from experience; they express their thinking on how they make decisions and solve problems. The report further claims that 70% of the 6.4 million new jobs created in the United States between the years 1998 and 2004, required primarily tacit interactions. Based on this viewpoint, one may infer that an organisation's ability to drive value hinges on the strength of the tacit interactions embedded in the relationships of its employees.

Relationships are therefore underpinned by the architecture of interactions that reside in formal organisational structures and/or in informal networks woven within the predefined organisational structures. Networks of relations co-exist in formal organisational structures that cross hierarchical and functional boundaries to facilitate execution of strategic work processes.

Organisational structures are subject to periodic restructuring. Cross, Borgatti and Parker (2002:25) argue from a corporate restructuring perspective by claiming that the impact of restructuring has forced employees to utilise their informal networks of collaborative relationships to perform their work rather than use the channels tightly prescribed by formal reporting structures or detailed work processes. The informal relationships among employees are often far more reflective of the way by which work gets done in organisations than relationships established by position within the formal organisational structure charts (Cross, Borgatti & Parker, 2002:25).

Mapping out the informal relationships may be achieved by utilising a technique, known in social theory as social network analysis (SNA). SNA provides a means of assessing networks by mapping and analysing relationships among people, teams, departments, business units or even the entire organisation. The analysis generates visual maps, akin to X-ray patterns which depict the way in which work gets done, and in so doing surfaces the real patterns of informal communications in the organisation (Cross, Parker, Prusak & Borgatti, 2001:100; O'Malley & Marsden, 2008:222).

Gretzel (2001) and Krebs (2010) validate this explanation that the SNA technique is indeed a mapping and measuring tool of relationships and flows between people, groups or interacting units. In addition, Suci and Miruna (2011:16) add that SNA is the process of mapping and measuring the relationships and flows not only between people, groups and organisations, but also between computers, URLs, and other connected entities that can generally be viewed as information and knowledge mediating entities.

Within the information and knowledge management (KM) discipline, Davenport and Prusak (1998:5) define knowledge as "a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information". Therefore, the use of the term 'knowledge' in the context of organisational structure, implies the experience, beliefs and ways of working that can be shared and communicated by employees in networks. The ways of working, are all forms of applied organisational information, that is, organisational knowledge that originates in the minds of the knowers in an organisational setting sharing knowledge (April & Izadi, 2004:9).

In terms of the association between knowledge sharing and corporate advisory networks, the knowledge that is shared in these networks is fundamentally linked to finding solutions to solve work-based problems on task-driven activities (Cross & Parker, 2010:21). Moreover, employees engage in dialogue in networks in order to re-formulate problems by making them less complex to understand and solve.

It is within the settings of such corporate environments described above that SNA can be applied as a diagnostic method for collecting and analysing data about the advisory and sharing patterns of relationships among people in groups. Patterns reflect the informal networks and the real way of how work is done. It is unlike the formal structures underpinned in organisational charts, where the charts may not really reflect the actual knowledge flow exchanges (Anklam, 2003). Also, Parker, Cross and Walsh (2001:24-25) emphasise that organisational charts rarely represent the actual networks of how work is performed in companies and suggest that to truly understand the real knowledge sharing taking place, companies need to perform a SNA which will enable managers to visualise the myriad of working relationships that either facilitate or impede knowledge creation, sharing and transfer.

The transfer of knowledge and whether knowledge can, in fact, be managed with the objective to facilitate knowledge sharing is a continuous debate. Nevertheless initial

research by Krackhardt and Hanson (1993:108) and other authors suggest that topics related to knowledge sharing and working relationships continue to be growing in volumes as reported in more detail in Chapter 3. Recent research by Tortoriello and Krackhardt (2010:167-179), Montemari and Nielsen (2013:525-527), and Wang and Chen (2013:873-874) shows not only how managers translate the myriad of organisational relationship ties into social network maps presented as diagrammatic pictures that show different relationship networks, but now also shows how relationship ties that span organisational boundaries "are conducive to the generation of innovations" borne from unselfish behaviour and promoted by "open and complete knowledge sharing among the parties involved" (Tortoriello & Krackhardt, 2010:170).

An overview of the literature reporting on SNA research in corporate context shows how different types of networks emerge, which include advice, trust and communicational networks. In corporate advice networks, the prominent players are shown in the organisation on which others depend to solve problems and provide technical information (Krackhardt & Hanson, 1993:105). Managers can therefore, use the analysis of such networks to restructure their formal organisations to complement with the informal networks and rewire the organisation to align with the company's goals.

Against this background, the current study investigates the informal networks of an organisation and specifically its corporate advisory networks in order to increase knowledge sharing. Within this context, organisational 'rewiring' efforts could imply the introduction of, and deployment of knowledge sharing programs in the organisation by appointing employees who have been identified in the SNA as advisory experts to start-up such programs. These experts could transfer their knowledge to the rest of the organisation through interventions such as the communities of practice (CoPs), peer assists, after action reviews (AARs) and storytelling techniques. These techniques are aimed at facilitating the process of knowledge sharing and transfer.

The terms 'knowledge sharing' and 'knowledge transfer' are sometimes used interchangeably in literature. The outlook of the current study is reflected in the words of Hsu (2008:1316) who states that –

Knowledge sharing refers to the activities of transferring or disseminating knowledge from one person, group or organisation to another.

Also, Hong, Suh and Koo (2011:14417) add that knowledge sharing occurs within a social context. Therefore, one may infer that knowledge sharing in this study is viewed as a process of transferring knowledge from one person to another person or group in a social corporate environment. Knowledge is shared by using different conscious and/or intuitive transfer techniques.

A CoP is a knowledge transfer technique which was first introduced by Wenger (1998) as a vehicle to promote the sharing of knowledge. CoPs are defined as groups of people who have a mutual interest in a topic and regularly engage in sharing and learning based on their common interests or methods of working (Sandrock, 2008:55). In addition, peer assists, AARs and storytelling (also known as narratives), are other knowledge transfer techniques by which knowledgeable people, top performers or experts can verbalise their tacit know-how and thereby make it explicit for other employees to use. Tacit know-how is composed of subjective knowledge, insights, and intuitions possessed by a person who has depth and understanding in a particular area (Wilson, 1997).

Knowledgeable people are valuable to the organisation. When performing an SNA investigation, it is important to evaluate the location of those people who have depth and understanding in a particular area, and they are referred to as actors in the network. Actors, also known as 'network players', will take on various roles and groupings in a network depending on where they are positioned in the network. They

can be identified as connectors or bridges, subject matter experts (SMEs) or leaders, peripheral players or isolates (Tortoriello & Krackhardt, 2010:170).

In social network theory, 'central connectors' are defined as individuals having the most direct connections in a network, and by virtue of this can have substantial influence on the network (Cross & Prusak, 2002:6). In the context of this study, central connectors are viewed as 'expert employees' in The Company¹ (*cf* Section 1.5). According to Cross and Prusak (2002:10), other linking roles include that of the 'information broker', also known as the bridge, who connects one sub-network with other sub-network(s). These brokers keep the different sub-groups in an informal network together. The broker role may have great breadth (not depth) of expertise and interpersonal skills necessary to be accepted by vastly different groups but not necessarily have depth of knowledge as is the case for the 'central connector' role.

Finally, one last non-linking network player described by social network theory is the 'peripheral actor' who could hold a 'peripheral specialist' (expert) role and be linked on the periphery of the network or be a complete 'isolate' who does not interact at all with the network. These outsiders may either be new hires who have not yet integrated into the organisation and therefore require, for example, on-boarding orientation interventions. Alternatively they may be peripheral specialists who prefer to work alone and invest time to network outside of their organisational network to stay ahead at the cutting edge of their field of expertise. Integrating them into the network would distract and frustrate them to a point where, according to Cross and Prusak (2002:11), they may exit the organisation they are currently employed at and look for a more accommodating employer.

Given the above overview, the objective of this study is to unfold the process of discovering the actors in the corporate advisory networks of employees who act as agents for sharing information and knowledge. The value of the study lies in

1 For confidentiality reasons, the company under investigation will be given the generic name of "The Company".

exploring the SNA methodology and its practical application. This mission is indicative of the rationale of the current study.

1.2 Rationale and benefits from the study

The business environment is more complex, competitive and uncertain than in the past. In order to succeed, organisations must utilise their employees' expert knowledge to rapidly create and deploy products and services for their customers (Wang & Chen, 2013:873-874). Moreover, since not all employees have the same level of expert knowledge, skills, abilities and competencies to perform at acceptable levels, organisations must consider a way to identify their experts and transfer the knowledge from the experts to less experienced employees (Davenport & Prusak, 1998; Hsu, 2008:1316; Yang, 2008:345; Wang & Noe, 2010:115).

Experts may be embedded in informal advisory networks in the organisation. This study argues that if business executives use SNA as a diagnostic tool, they will surface the informal network engagements of how employees connect and advise each other on work matters within a corporate environment. Once these advisory networks are discovered, the executive may want to understand how the knowledge flows through the employee networks to assess how the business operates. The assessment may entail understanding if employees within the respective departments are adequately collaborating with each other and whether they seek-out specific individual(s) whom they deem have the necessary expertise to advise them accordingly. Alternatively, an executive may strive to understand which employees are being sought-out by other functional areas for advisory support.

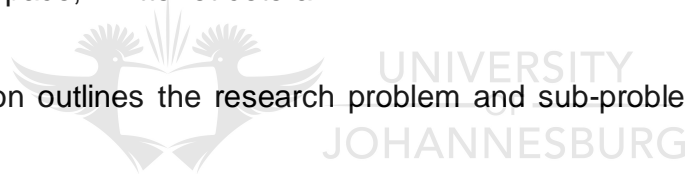
Based on the SNA assessment, the executive can then decide to put in certain interventions such as knowledge sharing programs spearheaded by the identified experts to accelerate the flow of knowledge within and across the entire organisation so as to enhance overall organisational performance levels and enable and ensure strategic objectives are met effectively and efficiently.

1.3 Delimitations of the study

Notably, the delimitation of this research study is that it will not explain the mathematics involved in formulating the sociographs or the descriptive statistics generated from the input data matrices. The study will only interpret the findings and draw conclusions from the automatically generated sociographs and descriptive statistics. In addition, bar charts will be produced using Microsoft Excel to further elucidate the results of the input raw data. In line with the academic report writing guidelines of the University of Johannesburg, Department of Information and Knowledge Management, illustrative charts are presented by means of figures (*cf* List of figures, page vi).

Also, the study is focused on organisational 'human' networks and will not cover online social networks as prescribed by social media platforms, like LinkedIn, Facebook, MySpace, Twitter et cetera.

The next section outlines the research problem and sub-problems associated with this study.



1.4 Research problem and sub-problems

Against the background, rationale and delimitations examined in the previous sections, the research problem is formulated by asking the following research question:

How can social network analysis (SNA) be used to discover the corporate advisory networks of employees to enhance information and knowledge sharing?

In order to address the research problem stated above, the following sub-problems will be considered:

- What is social network analysis and how can the SNA output be used to ignite knowledge sharing initiatives?
- What type of knowledge sharing initiatives can be applied practically in corporate environments?
- What does the SNA methodology entail in a corporate environment?
- How does SNA facilitate knowledge sharing through the discovery of corporate advisory networks?

Given the research problem and associated sub-problems, the next section covers the research methodology followed in this study.

1.5 Research methodology

In research, the research problem and sub-problems guide the nature of inquiry. Grounded within social network theory, this study's research design follows the methodology of social network analysis. SNA is regarded as the most suitable method to show how the actual advisory engagements occur within The Company under investigation. As mentioned above, the value of the study lies in exploring the SNA methodology. By practically applying the SNA methodology, network diagrams will be generated to surface employee interactions and highlight the different roles of actors in the network. Once the different actors are identified in the networks, a recommendation will be made to introduce and formalise knowledge sharing initiatives by selecting the key actors identified in the study to transfer their expertise to other employees in The Company. In this way the research is designed in order to optimally answer the main research question and sub-questions.

SNA, as applied in this study, will utilise Ucinet and Netdraw software packages to develop the social network diagrams (also known as sociographs). The software reference guides will be referenced to provide qualitative and quantitative analysis measurements for the interpretation of the sociographs. The actors in the network and the strength and weakness of the knowledge flows in the networks will also be

analysed and discussed in this study, following the example provided in the case study performed by Chan and Liebowitz (2006:19-35).

In the case of The Company, the objective is to discover the effectiveness of its Expert Departments employees' advisory engagements within and across The Company. In order to perform the above investigation, the research design entails empirical quantitative research, using primary numerical data collected from a survey. The researcher follows the guidelines of Mouton (2001:144,152), and uses a questionnaire as the data collection instrument (*cf* Annexure A, B and C).

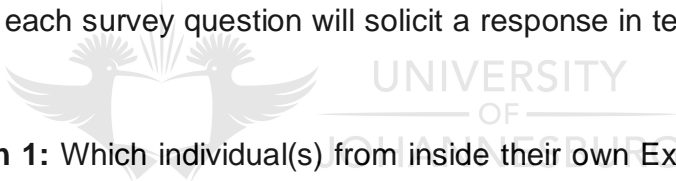
In network studies, the sampling technique in conventional terms utilises all data within a natural occurring cluster (or boundary) such as a classroom, organisation, club and neighbourhood. Selecting all data as units of observation implies a census type of sampling. The advantages of this approach are twofold:

- 1) It is free from sampling errors
- 2) The full network picture of the social structure is attained

Unfortunately, though, this approach can become very expensive and difficult to collect. For instance, obtaining data for every employee in a large organisation, and having every employee rank the level of interaction with every other member can be a very challenging task. Nevertheless, full network analysis is possible when the sample group is small. For large sample populations, the ego-centric method can be used. In this instance, the individual (also known as the 'ego') is asked to identify a limited number of specific individuals with whom the person has ties. The analysis of such an ego network means that albeit the full network picture is not attained, the individual's relationships and positional prominence in the organisation will be surfaced (Hanneman & Riddle, 2005). In this study, both the census type of sampling (full network data collection) and the ego-centric method was used.

The survey was designed into a structured questionnaire linked to Likert-type scales and focused on two main questions, listed below. The questionnaire was administered by the researcher to each employee who works for a department that is deemed as an Expert Department in The Company. Completion of the questionnaire was mandatory and non-negotiable yet administered in accordance to standard ethical considerations. For example, in SNA, the researcher would propose a set of short standard guidelines intended to form the basis for safeguarding participants in the social network study and to protect the long term viability of network research. In this regard, Borgatti and Molina (2005:114) provide useful guidelines in the form of a short disclosure contract or consent form that would cover aspects on study authorisation; rights of the researcher; rights of the company and rights of the participants. These and other issues related to ethics, as well as data validity and reliability are discussed in more detail in Chapter 5.

Fundamentally, each survey question will solicit a response in terms of the following criteria:



Question 1: Which individual(s) from inside their own Expert Department do they approach for advice on work related matters? The employee from each Expert Department will select and tick off the applicable name(s) from a predefined list of names and assign a frequency number (the degree of interaction) next to each ticked name. This question covers census type of sampling.

Question 2: Which strategic business unit (SBU) or units (SBUs) outside of their own Expert Department approach them for advice on work related matters? The employee from each Expert Department will again select and tick off from a predefined list of SBU names and assign a frequency number next to each selection. This question covers the ego-centric method type of sampling.

Once the questionnaires were filled in by the respondents and received by the researcher, the raw data was entered into the Ucinet Network matrix software and into Microsoft Excel, respectively. The results produced sociographs and Microsoft Excel bar charts, respectively (*cf* Chapter 5).

Based on the above research design the research methodology will entail subsequent analysis, surfacing the current engagement issues associated with:

- How employees within the Expert Departments interact with one another in the departmental network?
- To what extent they are soliciting, advising and learning from each other?
- Who are the individuals whom are more prominent key players and who are the peripheral or brokering ones in the Expert Departments?
- Who are the individuals who are being solicited the most for advice on work issues?
- Which employees from the Expert Departments engage with and provide advisory consultative support, outside of their own Expert Departments, across to other SBUs within The Company?
- Who are the individuals who most prominently provide this type of consultative support?
- Which SBUs are receiving this support from each respective Expert Department?

Fundamentally, therefore, the study focuses on the internal advisory Expert Departmental connections and the external consultative support provided to the SBUs by the Expert Departments. To this extent, both deductive and inductive generalisations as well as retroductive reasoning will be used to draw conclusions on the findings of this analysis (Mouton, 2001:117-118). Recommendations will be given in terms of key individuals who can initiate knowledge sharing programs based

on the results and inferences made. However, these inferences may only carry significance if the theoretical framework is based on a thorough literature review.

The literature consulted during the proposal phase and throughout the study formed the basis of understanding from which other forms of inquiry were conducted, such as the empirical study described above. Literature on the latest SNA practices, corporate advisory networks and other knowledge sharing related issues was consulted as part of the literature review.

1.5.1 Literature review

The objective of the literature review was to understand the theoretical principles of social network theory, SNA applications and knowledge sharing principles and practices. Since knowledge sharing occurs in social contexts, the networks identified by SNA are the ideal social architectural frameworks from which to launch knowledge sharing interventions. The findings of this study's literature review are presented in the first three chapters of this study. The chapter outline is consequently summarised in the next sections.

1.5.1.1 Chapter 1: Introduction to the research problem and its context

The current chapter is principally aimed at introducing the research problem and sub-problems associated with the study. It also provides an overview of the importance of informal networks in organisations. As mentioned above, networks of relations co-exist in formal organisational structures and are perceived as the link that reaches across functional boundaries to facilitate execution of strategic work processes. Knowledge sharing occurs in the advisory relationships, thereby enhancing overall performance of strategic processes enabling work objectives to be met.

Moreover, Chapter 1 fundamentally sets the foundation for the comprehensive literature review discussions pursued in Chapter 2 and Chapter 3. Based on the literature review, the platform is set to conduct the empirical research carried out in

Chapter 5 which follows on Chapter 4, motivating the chosen research design for this study. Each of these chapters was dedicated to explore the research question and the stated sub-problems as outlined below.

1.5.1.2 Chapter 2: Social network analysis

Chapter 2 discusses the fundamental social network theories, network characteristics, history, applications and principles of social networks and SNA. In management theory, the organisational network analysis (ONA) technique is a management tool adapted from SNA, used to help corporate leaders in organisations assess the patterns of informal networks among employees, teams, functions and organisations. Employees identified in critical positions in the networks would take on either one of three types of roles.

The first, the central connector role, advises and influences colleagues; this role is viewed as the opinion leader and SME employee who has the most connections in the network and is able to keep the network intact and functional.

The second, broker role is viewed as the person who has ties across sub-networks and helps break the silos driven by formal organisational structures. Brokers are good at spotting opportunities and transferring ideas and knowledge across sub-networks and integrating expertise from different sub-networks.

The third and final role is the peripheral employee who has the least number of connections and resides either on the boundaries of the network or may be completely disconnected from the network. Peripheral employees could be new hires who are not yet integrated into the network of the organisation or dissatisfied and disengaged employees or peripheral specialists who have niche expertise and prefer to reside on the outskirts and interact with external experts (outside of the organisation) in their field of expertise. The specialists' niche expertise is utilised when novel insights and innovative solutions are required to business operations.

These three roles, therefore, represent the network roles played by different employees in the organisation irrespective of their rank or job role in the organisation. The network role-players also represent the employees who act as key knowledge sharing agents to enable the effective execution of knowledge sharing in the organisation. Chapter 2, therefore effectively responds to the sub-problem, namely –

What is SNA and how can the SNA output be used to ignite knowledge sharing initiatives?

1.5.1.3 Chapter 3: Knowledge sharing initiatives in corporate environments

Chapter 3 describes knowledge sharing as applied in corporate environments. In the realm of KM, knowledge sharing is one of the key activities through which employees, especially network role-players share their knowledge within and across teams in an organisation. In so doing, they transfer their know-how (that is, expertise, experiences, lessons learnt and insights) to less knowledgeable employees, thereby enabling these employees to re-use this knowledge and execute their task-based activities, solve problems and perform better in their jobs to once again meet organisational work objectives.

Given the potential benefits that are realised from knowledge sharing, formalised knowledge sharing interventions can be put in practice in corporate environments. Examples of interventions (known as methods and techniques) include such practices as CoPs, peer assists, AARs and storytelling alluded to in the introduction above. These techniques are aimed at facilitating the process of knowledge sharing and transfer. Chapter 3, therefore effectively responds to the second sub-problem, namely –

What type of knowledge sharing initiatives can be applied practically in corporate environments?

1.5.1.4 Chapter 4: Research methodology and design

Chapter 4 describes the research methodology followed in this study aimed at investigating SNA methodology and its practical application in the corporate world. In order to perform the investigation, the research design entailed empirical quantitative research, using primary relational numerical data collected from a survey, the data collection instrument a questionnaire. The SNA is the most appropriate technique for discovering, analysing and measuring network relationships and mapping out such network relationship structures. The target population sampled was the Expert Departments' employees of The Company. Census type of sampling and ego-centric sampling techniques were applied on these employees respectively to assess the advisory networks present within each Expert Department and across to other functional areas in the business, known as SBUs.

Theoretical notions of SNA theory, graph structures and relational measurements are also discussed to explain the approach taken for the method of analysis used. Microsoft Excel bar charts are used to further elucidate the relationships that exist between Expert Departments and the functional areas. Chapter 4, therefore effectively responds to the third sub-problem, namely –

What does the SNA methodology entail in a corporate environment?

1.5.2 Empirical research

This section of the study is dedicated to the empirical research component, along with its findings. In addition, some recommendations are made for implementing the findings by encouraging, for example, the start-up of knowledge sharing interventions in The Company.

1.5.2.1 Chapter 5: Results and interpretation

In this chapter the empirical research is discussed in terms of the survey results, the practical application of the SNA methodology and the findings that were made.

Employees from the three Expert Departments, namely EVA, WOR and ENV (cf Section 5.2) responded to the same two key survey questions reflected in Section 1.5 above. The SNA methodology was applied to surface the network patterns within each department using census type sampling, while the cross functional interactions between Expert Department employees and SBUs used the ego-centric sampling technique.

The responses of the surveys were collated and analysed using SNA software. The findings generated sociographs (also known as sociograms), bar charts and calculated relational measurements for the binary matrices formulated from the survey data.

The narrative interpretation of these findings emphasised the high levels of frequency network interactions among all Expert Department employees signifying that employees are frequently seeking out expert employees for advice. Moreover, the high network density values and short geodesic distances among Expert Department employees show that informational knowledge (that is, tacit knowledge made explicit) flows freely and quickly through the networks of the Expert Departments.

Other significant findings pinpointed the employees who keep the networks intact and provide advisory support within their departments and those who facilitate consultative advisory engagements across to other functional areas (SBUs). Chapter 5, therefore effectively responds to the fourth sub-problem, namely –

How does SNA facilitate knowledge sharing through the discovery of corporate advisory networks?

The chapters outlined above, each explores the main research problem, with Chapter 6 drawing the conclusion to the research question that was initially stated, namely –

How can SNA be used to discover the corporate advisory networks of employees to enhance information and knowledge sharing?

1.5.2.3 Chapter 6: Conclusion and recommendations

In Chapter 6, the key findings of this study suggest that in a fast paced business environment, critical work activities are indeed occurring in informal corporate advisory networks that are often not identified and/or visualised, nor understood and/or supported by executive leaders. SNA is a diagnostic management tool that provides the means of visualising and assessing the health of network patterns among individuals and departments, or across boundaries, such as in functional groups. Executives could assess their organisations' network patterns and based on the results intervene strategically through knowledge sharing interventions to enhance collaboration among different areas of the business and thereby yield higher overall organisational performance levels to meet and even exceed strategic work objectives.

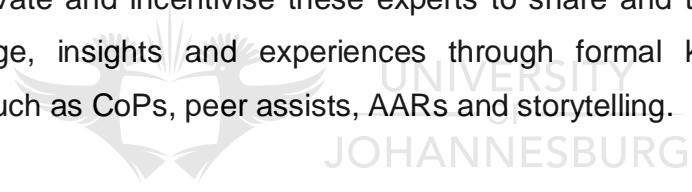
Based on the findings, the general conclusion and recommendation reached in this study is that employees identified in the SNA as key advisory agents, be recognised, incentivised and rewarded for their advisory efforts by being appointed as 'Knowledge Champions' to spearhead knowledge sharing programs. For instance, they could form CoPs or apply knowledge sharing techniques such as peer assists, AARs and storytelling to share their expertise and knowledge.

The broader value of the study lies in the systematic manner of unfolding the process of discovering the actors in the corporate advisory networks of employees who act as knowledge sharing agents. This may lead to other companies' successful endeavours of initiating or strengthening their organisational knowledge sharing programs through the practical application of SNA methodology.

1.6 Research summary

In the current competitive and often uncertain business environment, skillful executives need to leverage off the expertise of their company employees in order to remain competitive and service their customers effectively. Since not all employees in the company have expert knowledge, business executives need to discover the advisory networks of expert employees embedded in formal organisational structures and encourage them to share and transfer their expert knowledge to novices and/or less knowledgeable employees.

In light of the above argument, a diagnostic technique known as SNA can be used to map and measure the advisory relational X-ray patterns present within organisational departments and across to other functional areas. Once the patterns have been discovered and the key expert networked employees identified, the next step is to motivate and incentivise these experts to share and transfer their know-how, knowledge, insights and experiences through formal knowledge sharing interventions such as CoPs, peer assists, AARs and storytelling.



Chapter 2

Social network analysis

2.1 Introduction

This chapter aims to provide an overview of the fundamental theories, history and principles of social networks and social network analysis (SNA). A brief background is given on how corporate leaders rely less on traditional management methods of well-defined job roles and formal accountability structures to drive operational excellence. Instead, the most effective organisations make use of employee networks to reduce costs, to collaborate and to improve workforce efficiency (Cross, Gray, Cunningham, Showers & Thomas, 2010; Wang & Chen, 2013:874).

Moreover, the organisational network analysis (ONA) technique is a management tool adapted from SNA, used to help business executives and corporate leaders in organisations assess the patterns of informal networks among employees, teams, functions and organisations. The results of such an analysis would show corporate leaders the invisible collaborative networks present within their formal organisational structures. Critical employees working in the invisible networks would also become visible. These employees could facilitate the flow of knowledge and act as agents to support knowledge sharing activities in the network. With increased knowledge sharing, organisational performance and productivity gains in organisations would be realised.

The literature review below discusses the theoretical principles and applications of SNA in corporate environments.

2.2 Networks in organisations

Over the past couple of decades, innovations in management science and the continuous development of information and communication technologies have pushed organisations toward a "boundaryless environment" operating in collaborative informal networks (Ashkenas, Ulrich, Jick & Kerr, 2002; Phelps, 2007:17-29; Smith & Mireles, 2010:226; Tortoriello & Krackhardt, 2010:170). On the inside, organisations have undergone re-engineering (streamlining their business processes) and de-layering, forcing staff to collaborate across hierarchical layers, across functional teams and across physical geographical distances, pushing decision-making and accountability downward into the hands of knowledge workers. On the outside, joint ventures, alliances and supply-chain integration have blurred borders between companies (Cross, Nohria & Parker, 2002:70; Chan & Liebowitz, 2006:20; Cross *et al*, 2010).

As a result of these changes, traditional formal reporting structures and detailed work processes have a much reduced role in the way important work is accomplished. Instead, informal networks of employees are increasingly at the forefront, executing strategic imperatives and accomplishing operational excellence so that organisations remain sustainable and competitive (Cross, Nohria & Parker, 2002:67; Marouf, 2007:111; Cross *et al*, 2010; Wang & Chen, 2013:874).

Given the above background, employee networks can be viewed as the 'bridging glue' of collaborative relationships that cross hierarchical, functional, and geographical boundaries to facilitate execution of strategic work processes (Parker *et al*, 2001:27). With increased accountability and decision-making in execution of work, the employees (in the networks) feel more empowered and more satisfied in their jobs. Satisfied employees are retained longer in their jobs. Consequently, the employees' institution-specific knowledge and skills accrued from collective experiences – also called organisational memory – is retained longer and the organisation's staff turnover costs are reduced (Anklam, 2003; Kransdorff, 2012).

Although many corporate leaders intuitively understand the importance of networks, few spend any real time assessing and supporting informal structures due to their invisible nature as formal organisational entities. Nevertheless, if corporate leaders do make a concerted effort to support such structures, they can improve the flow of knowledge and information through networks, acknowledge thought leaders in the networks, detect bottlenecks and target opportunities where increased knowledge flow can impact the bottom line (Anklam, 2003).

Cross, Nohria and Parker (2002:68-69) state that in knowledge-intensive sectors of industry where people use relationships to find information or solve problems to do their jobs, informal networks – also known as social networks – are considered as important structures. They give an example of how engineers and scientists were roughly five times as likely to turn to colleagues for information as opposed to impersonal sources such as databases or the internet. Despite the explosion of information available online, employees still rely heavily on their networks to help them with their work activities; even though technology provides a network platform, human relations give substance to social networks.

2.2.1 Definition of a social network

Social theorists, Wasserman and Faust (1994:20), define a 'social network' as "a finite set or sets of actors and the relation or relations defined on them", whilst organisational management theorists Hanneman and Riddle (2005) and Hatala (2006:50) define it as a set of individual people or groups of people (for example, employees or collectives such as organisational departments), known as 'actors' some of whom are connected or 'tied' by a set of one or more relations.

Based on these two definitions, a social network can be represented graphically as a set of circular nodes connected by lines. The lines are the 'ties' (in literature sometimes also referred to as relations, edges, lines, links or connections), connected to nodes, also known as the 'actors' (Haythornthwaite, 1996:324;

Hanneman & Riddle, 2005; Knoke & Yang 2008:6). The analysis and study of the social network graphs is known as 'social network analysis' (*cf* Section 2.7), which involves knowledge of social network tie characteristics.

2.2.2 Social network tie characteristics

Wellman and Berkowitz (1988:4) claim that social networks portray different types of ties between actors even where observations are restricted to the same set of actors. For example, a friendship network among a set of office employees may very likely differ from their advice-seeking network (Knoke & Yang 2008:8). These researchers, Knoke and Yang (2008), argue that relationship ties among actors have both 'content' and 'form' characteristics. Content implies the "interests, purpose and drives or motives of individuals in an interaction", whereas form refers to the "modes of interaction through which specific contents attain social reality" (Knoke & Yang, 2008:10-11). Form refers to –

- 1) The frequency (or strength) of interaction between a dyad (pair of actors)
- 2) The direction of relations between pair of actors

For example, if actor [A] advises actor [B] but [B] does not advise [A], then a mono-directional, directed asymmetric relationship exists, whilst if [A] advises [B] and [B] converses with [A], then a bi-directional, non-directed (also known as undirected) mutual relationship exists (Knoke & Yang, 2008:8).

In respect of relationships, a vast variety of types of relationships are distinguished in literature (*cf* Seetharaman, Ehsan, Low & Saravanan, 2004:524; Faulconbridge, 2007:931-933; Sandru, 2010:71; Boer, Berends & Van Baalen, 2011:87-88; Grant, 2013:93; Adachi, Gretczko & Pelster, 2013:8-25; Montemari & Nielsen, 2013:525-527). In respect of relational content, the types of relationships as distinguished by Sandru (2010:63-70) are highlighted here because it relates to the epistemic and methodological aspects of network analysis, namely:

- 1) *Transaction relationship*
Actors exchange physical or symbolic information such as a transaction relating to economic sales and purchases.
- 2) *Communications relationship*
Linkages between actors are conduits through which messages are transmitted.
- 3) *Boundary penetration relationship*
Ties consist of membership in two or more social formations, for example, co-operation boards of directors sitting on more than one board.
- 4) *Instrumental relationship*
Actors contact one another in an effort to secure services such as advice, information on job availability or secure valuable goods.
- 5) *Sentiment relationship*
Relations in which actors express affection, admiration hostility or loathing.
- 6) *Authority (power) relationship*
These types usually occur in formal hierarchical organisations where actors either issue or obey commands.
- 7) *Kinship and descent relationship*
Bonds of blood and marriage reflect relations among different family roles.

Given the above, it is evident that multiple relation types exist in society. The type formed depends on the context of the relationship. In the sections that follow, the theoretical principles, analysis and structure of relationships are discussed to gain further clarity on the fundamentals of social relationships (social networks).

2.3 Origins of social network theory and social network analysis

Although some of the ideas of social network theory and analysis are found in the writings of scholars going back to the ancient Greeks, the main development of the field occurred in the 1930s within three different distinct groups, namely –

- 1) The Sociometric analysts who produced and used graph theory methods
- 2) The Harvard researchers who explored patterns of interpersonal relations and the formation of cliques
- 3) The Manchester anthropologists who built on both of these strands to investigate community relations in village societies

These distinct groups were identified reading Scott (1991), Hatala (2006:48), Martino and Spoto (2006:54); their research assists in investigating the origins of SNA.

2.3.1 Sociometric analysts – the first distinct group

The sociometric analysts were involved in the Gestalt theory. The concept 'gestalt' refers to an organised whole pattern where the nature of the parts is determined by the whole pattern, parts are secondary to the whole (Scott, 1991:8; Martino & Spoto, 2006:54). Lefton (1997) reveals Wolfgang Köhler (1887-1967), a psychologist, as one of the original theorists in the Gestalt theory. Köhler performed studies on how the mind works. He claimed the brain processes sensory stimuli and sees objects as wholes. For example, when looking at a painting, once sees the overall image rather than individual brush strokes. Köhler emphasised that one must examine the whole to discover what its natural parts are, and not proceed from smaller elements into wholes (*cf* Köhler, 1947; Sahakian, 1970; Lefton, 1997).

Apart from Köhler, Kurt Lewin, Jacob Moreno and Fritz Heider also made significant contributions in this era (Martino & Spoto, 2006:54-55). Lewin studied group behaviour, which he said was a function of conflicting social forces. He thought of the group as existing in a social space or field consisting of the group and its perceived environment. The group and its environment interact and the meaning of these interactions is constructed by the group members on the basis of their perceptions and experiences. Lewin argued that the structural properties of this social space could be investigated mathematically using Vector theory. Vector theory became the basis from which the development and application of Graph

theory was introduced by Cartwright and Harary in the 1950s. According to Scott (1991:10,12) and Martino and Spoto (2006:54), Graph theory is a powerful tool for social structure analysis.

Moreno, mentioned above, explored psychotherapeutic methods to uncover the structure of friendship choices (Scott, 1991:9). Using techniques such as controlled observation and questionnaire inquiries, he found ways in which people's group relations served as both limitations and opportunities for their actions and, therefore, for their psychological development. Based on these studies, Moreno established sociometry which investigated the relationship between psychological well-being and "social configurations" (Martino & Spoto, 2006:54). These social configurations are the social structures formed from concrete patterns of interpersonal choice of relations. Moreno believed that large scale social phenomena, such as the economy and state, were sustained and reproduced over time by the small scale configurations formed by people's patterns of friendship, their dislikes, and other relations (Scott, 1991:9)

Based on sociometry, Moreno invented the 'sociogram' – also known as a social graph – as a way to represent the social configurations (social structures) among people. Before that, ideas like the 'social fabric' or 'social network' were just vague ideas. Moreno used sociograms to identify social leaders and isolates, to uncover asymmetry and reciprocity in friendship choices, and to map chains of indirect connection. One of the configurations he observed was the sociometric 'star' (the social leader), an individual chosen by many others who was recognised as holding a position of popularity and leadership. The sociograms not only identified individuals, but visualised the pathways through which information and knowledge could flow from one person to another and through which one individual could influence another (Scott, 1991:10). This visualisation led to the birth of what is known today as 'social network analysis'; this concept is described in more detail later on, but first the origin of SNA is further investigated, for instance, the work of Heider is recalled.

Heider worked in the area of social perception and attitudes (Scott, 1991:11). He developed what is known as Balance theory. He said the mind seeks balance (an absence of tension) by trying to hold ideas that are not in conflict with one another. This also applies to attitudes towards other people. He was especially concerned about what happens when a person is emotionally close to two people who start becoming hostile to each other. For example, if [A] likes [B], then [A] wants to like and dislike all the things that [B] likes and dislikes. If [B] dislikes [C], then [A] wants to dislike [C], but what if [A] and [C] are friends? There is a tension that must be resolved. One solution is to choose sides; [A] could dislike [C], say Martino and Spoto (2006:68), and in so doing affect others. In groups, imbalances are felt by group members.

Imbalances in groups develop because not everyone is interacting equally with everyone else at the same time. But once the imbalances make themselves felt, they exert force to resolve themselves, leading to changes in the group structure (Scott, 1991:12; Martino & Spoto, 2006:68).

Scott (1991:13) and Martino and Spoto (2006:55), report on the work of Cartwright and Harary who showed mathematically that the outcome of imbalances results in a group subdividing slowly into so-called 'cliques'. Cliques are otherwise also known as clusters or sub-graphs.

2.3.2 Harvard researchers – the second distinct group

At Harvard University in the 1930s to 1940s, one of the biggest emphases in social anthropology was on social relations (Martino & Spoto, 2006:55). Researchers at Harvard were developing some of the ideas of the British social anthropologist, Radcliffe-Brown. They produced a number of important factory and community studies, which emphasised the de-composition studies of interpersonal structures

composing a graph as well as the informal interpersonal relations in all social systems (Scott, 1991:8).

Of particular importance, two leaders, Warner and Mayo, researched the Hawthorne plant of the Western Electric Company in Chicago (Scott, 1991:17). They conducted worker efficiency studies where they tried to figure out how alterations in the physical conditions of work (heating, lighting and rest periods) affected productivity. They found that productivity seemed to increase with any change they made because of the participation of workers in the research study. Workers felt appreciated by management and, therefore, motivated them to higher productivity levels. Based on this observation, Warner and his team focused their studies anthropologically, and watched how people work all day, giving special attention to the relationships among the workers. In the process, explain Martino and Spoto (2006:55), they discovered the 'informal organisation', the hidden social structure which seemed to have as much effect on worker productivity as did the changes to the physical conditions of work.

Moreno's sociometry, and Warner and Mayo's theories were unified by a Harvard professor, Homans, who thought sociometry was to be a good and valid foundation for analysing social networks (Martino & Spoto, 2006:55).

2.3.3 Manchester anthropologists – the third distinct group

In the 1950s, the fundamental development in SNA was due to researchers from Manchester University Department of Social Anthropology. They focused their attention on the effective configuration of relationships deriving from power and conflict between individuals (Martino & Spoto, 2006:55).

Researchers such as Nadel and others began their fundamental works in the underlying properties of structural analysis. Nadel's investigations looked at the structure of relations among people affected not only by the individual interactions but by the cohesiveness of the network as a whole. He also proposed the value of

the use of algebraic tools for the analysis of different roles in networks (Martino & Spoto, 2006:56).

Other researchers in the 1960s, for example White and his team, continued building on the role analysis concept suggested by Nadel (Martino & Spoto, 2006:56). White focused on the mathematical aspects of SNA to formalise the different structural relations inside a group of actors (social relations among nodes). He took the notion of the different 'social roles' actors played in groups and translated them into mathematical form. The roles could thus be measured and modeled (Martino & Spoto, 2006:56; Durugboa, Tiwari & Alcock, 2013:598).

Given the historical account above, one can deduce that the origins of social networks are interdisciplinary because social psychologists, anthropologists, and mathematicians have jointly contributed into the academic development of this field. The current study approaches SNA from a knowledge management (KM) perspective; thus continues the literature review of SNA and knowledge sharing which includes the topic of the strength of weak ties.

2.4 The strength of weak ties

Given White's work mentioned above, Mark Granovetter in the 1970s used White's theory to build his theory on the importance of the strength of so-called 'weak ties'. According to Schultz-Jones (2009:594-595), Granovetter's information diffusion model consists of network segments held together by weak ties (weak means infrequent contact). His research on the flow of job related information demonstrated that the power of acquaintances in a network of social relations was more influential than egocentric personal relations. The short, weak chains of connection proved to be of the most benefit and significance in receiving useful job information.

The truth of this theory is most often experienced when people are searching for a job. The opportunities they hear about do not come from the people closest to them as they have many of the same contacts and context as themselves. Acquaintances,

however, have their own networks and strong ties to many people unknown to these job seekers. Job seekers, therefore, can contact and ask acquaintances to help them find a job (Anklam, 2005:36). This assumption also holds true when for example, employees need to bridge organisational-boundaries to source novel ideas for innovation purposes, such as in new product development (Tortoriello & Krackhardt 2010:167).

Although weak ties facilitate access to bridge people with novel information and knowledge, strong ties are equally important in networks. Strong ties form because people tend to be 'homophilous', meaning that they tend to have stronger ties with people who are similar to themselves. This leads to forming trusted reciprocated relations where people are generally more willing to share instrumental resources, such as in advice seeking resources (Van der Hulst, 2009:107; Borgatti & Halgin, 2011:3).

2.5 Structural holes

Ronald Burt of the University of Chicago studied inter-organisational relations in the 1970s to 1980s and approached the analysis from a structural perspective (Schultz-Jones, 2009:595). Burt's hallmark relates to the development of the concept of 'structural holes'. He identified and located gaps or 'holes' in an organisational structure where linkages are missing. As a result, the missing links fragment the organisational structure into multiple sub-structures.

However, if a corporate leader "fills the holes" says Schultz-Jones (2009:595), with so-called "key broker connections" either internal (inside the organisation) or external (outside of the organisation), then sub-structures connect and open the doors for business opportunities. Burt's concept is therefore, fundamental to understanding the behaviour of organisations in various inter-relational sectors of the economy. He has advanced the study of networks beyond interpersonal relations to inter-disciplinary applications of network theory.

2.6 Small world

The small world phenomenon is the postulation that the chain of social acquaintances required to connect one arbitrary person to another arbitrary person anywhere in the world is in fact, a generally short chain (Milgram, 1974). According to Martino and Spoto (2006:55-57) and Richardson (2009:578) the concept gave rise to the famous phrase "six degrees of separation" after a 1967 small world experiment was conducted by psychologist Stanley Milgram. In Milgram's experiment, a sample of US individuals was asked to reach a particular target person by passing a message along a chain of acquaintances. The average length of successful chains turned out to be about five intermediaries or six separation steps.

The phenomenon suggests that as individual ties grow geometrically as new actors are added to the network, the shortest path between the actors (even in a network with thousands of actors) can be determined with a relatively small number of steps. This shows the "world as being small" even if large network structures are visualised (Richardson, 2009:578).

2.7 Social network analysis

There is a distinction between social network theory and SNA. Social network theory seeks to explain the generalisations of the relationship phenomenon, whilst SNA is not a scholarly discipline but rather a methodology used to research network behaviour (Schultz-Jones, 2009:593). SNA is defined by Cross *et al* (2001:103) as –

A rich and systemic means of assessing networks by mapping and analysing relationships among people, teams, departments, or even entire organisations.

By the same token, Chan and Liebowitz (2006:21) declare that SNA focuses on analysing the relationships (ties) among the employees (actors) in terms of

knowledge sharing and knowledge acquisition. For example, a question such as "Who do you ask for technical advice?" could be used to determine the advisory relationships among actors (Chan & Liebowitz, 2006:21).

The result of such an analysis determines who the technical experts are and shows where the strengths as well as the inefficiencies in knowledge flows occur in the network. Corporate leaders thus gain visibility into the invisible network of relations between employees. The leaders learn which employees possess power in the networks and how various partnerships function. Based on these insights, leaders intervene to redesign the networks to improve the performance of their organisations (Krackhardt & Hanson, 1993:104-108; Chan & Liebowitz, 2006:21-22).

Cross *et al* (2001:103) also point out that although many corporate leaders think they know their organisations, studies show that they have imprecise levels of understanding of how the informal organisational structure operates around them. By virtue of their position in the hierarchy, leaders are frequently removed from the day-to-day work interactions and consequently have very inaccurate perceptions of the actual work patterns taking place in their organisations. These perceptions are worsened by the transition into virtual work environments and telecommuting (Cross *et al*, 2001:103). As a consequence, employees are often engaged in work relationships that are invisible to their superiors.

Nevertheless, to remedy these imprecise perceptions, SNA can be used to reveal the way in which work is or is not carried out in informal networks. Typically the 'output' of SNA is generated in the form of an "X-ray view" (Cross *et al*, 2001:103). SNA output represents the relationships present in a network and is called a sociogram or sociograph as illustrated in Figure 2.1.

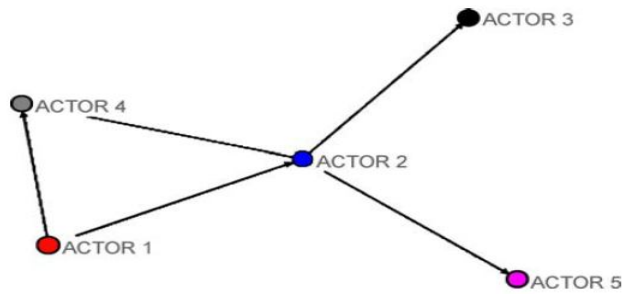


Figure 2.1: SNA output referred to as a sociogram or sociograph (Van der Hulst, 2009:106)

Figure 2.1 above depicts an example of a sociogram; this X-ray view portrays actors represented by nodes and the ties linking actors as directed arrow lines. The direction of the arrows, illustrates, for example, the informational advisory flows being sent from one actor to another actor without reciprocation, for example, Actor 4 seeks informational advice from Actor 1 or put differently, Actor 1 provides information to Actor 4.



2.8 From social network analysis to organisational network analysis

In the business context, the techniques and methods of SNA have been adapted and refined to applications seeking to diagnose mostly the relationships among individuals and groups inside organisations and sometimes diagnose the relationships across organisational boundaries outside the organisation. This technique is known as ONA, and leverages off decades of work in the social sciences discipline of analysing social networks (Ankam, Cross & Gulas, 2005:540).

In general, the ONA methodology begins with a survey that requests individuals in an organisation to answer a series of questions about their relationships with others in that organisation. Each question asked, reveals a different aspect of the relationship. For example, a question relating to advise-seeking may be posed as: "Whom do you turn to for advice in solving a challenging problem at work?" The

survey responses are collected by the researcher conducting the ONA and data is analysed statistically and presented visually using software tools.

The result of such an analysis provides insight into the structural qualities of a network and gives visual and data-derived views of the current state of relationships in the network (Anklam *et al*, 2005:540; Anklam, 2007:162). The data results are then discussed with either the participants of the survey or discussed with the respective manager(s) of the network and interpreted in the right context given the current organisational structure and operation. With a clear understanding of the organisational network, the manager(s) can make the appropriate changes to positively impact the knowledge transfer and communication flow in the network thereby achieving the organisational business goals (Viant, 2002).

For example, specific actions can be undertaken to address changes to the organisational structure to eliminate bottleneck intermediaries, open up connections between parts of an organisation or reassign intermediary staff to encourage sharing of knowledge and limit the hoarding behaviours of the employees. This in turn, would result in the increase in the number of connections overall, and would enable employees to learn from each other's skills and knowledge (Anklam, 2007:170). Other interventions may include, identifying who the peripheral connectors in the network are and integrating them back into the network (Cross & Parker, 2004:80), or determine where the expertise is located within the organisation, that is, determine who the experts are in the organisation who are being solicited for advice (Cross & Parker, 2004:71).

According to Hsu (2008:1322), Suciú and Miruna (2011:18-19), Wang and Chen (2013:874) analysing organisational networks is critical in determining key positions in networks, diagnose problems and opportunities and stimulate and improve organisational performance. Given the above context, ONA is considered a powerful descriptive, diagnostic tool for corporate leaders to visually see what goes on inside

their organisations. The benefits of organisational networks are many as are the benefits of analysing these networks.

2.9 Benefits of organisational network analysis

Hutchinson Associates (2005), promote the benefits of ONA by stating that it provides insights into:

- The structure of existing networks and how work is accomplished in the organisation
- The identification of teams and/or individuals playing central roles, such as the thought leaders, also known as the 'advice-giving' experts
- Experts or central players are encouraged to share their vital corporate knowledge and are retained by the organisation to reduce turnover costs and preserve the collective organisational memory
- The identification of isolated teams or individuals whose knowledge is not optimally leveraged
- Smarter decisions can be made about changing the formal organisational structure or introducing new processes into the organisation after the existing network structure is known
- Knowledge brokers' role of connecting disparate sub-structure groups together
- The identification of knowledge brokers who could become potential bottlenecks because of either being overburdened with work inquiries from other network members or because they intentionally hoard information or knowledge from other members
- Targeting opportunities where increased knowledge flow in the network will have the most impact on the organisation
- Decreasing the amount of time it takes for employees to locate and access needed knowledge

- Improving communication flows within and across organisational boundaries, following organisational changes such as, in restructuring, mergers or acquisitions settings

Although the above list is not a comprehensive list, it suffices in presenting an overview of some of the benefits of ONA. Similarly, Viant (2002) at Welch Consulting Services concurs with Hutchinson Associates' statements above. For Welch Consulting Services, ONA pinpoints the individuals who are critical to the success of the business and reveals the bottlenecks and gaps where better connectivity would surface the "explicit way" the business accomplishes its work (Viant, 2002). ONA is a technique that shows managers how to make "surgical changes" in the structure to address flaws in the network, says Viant (2002).

In addition to the benefits listed above, Viant (2002) further adds that ONA evaluates the internal and external connections. Internal connections, implies the level of connectivity within departments, business units or teams. A manager would have to evaluate, particularly, how redundant the connections are to mitigate the risk of losing key employees and/or assess whether the level of connectivity meets the organisation's goals.

External connections are assessed too. A manager would need to consider how well connected the organisation is across its business units, across physical, functional, hierarchical or organisational boundaries or with an outside partner to enable cross fertilisation of ideas to occur for innovation to emerge (Viant, 2002). More benefits of ONA appear in its application, as discussed in the next section.

2.9.1 Common applications of organisational network analysis

Senior executives employ cross-collaborative organisational projects, such as in partnerships or post-merger acquisitions to leverage their consolidated organisations' unique competences. ONA would highlight the effectiveness of such

projects in terms of how decisions are taken and how information and knowledge flows (Cross & Parker, 2004:8)

Alternatively, executives may wish to improve their strategic decision-making in top leadership networks. In this case, executive teams use ONA to assess their connections among themselves and the layers beneath them. ONA reveals how the leadership teams acquire or release information, make sound decisions and convey those decisions to the broader organisation (Cross & Parker, 2004:8).

Other applications include promoting innovation and developing communities of practice (Cross & Parker, 2004:9). In innovation applications, such as in process improvements or new-product development, ONA assesses how a team is integrating its expertise and how effective it draws the expertise of others within the organisation. CoPs, on the other hand, are not formally recognised teams within the organisation but are critical to a corporate environment in that they have the ability to leverage off the expertise distributed across physical locations or that of silo-based organisational designs. ONA uncovers the key members of the community and assesses the overall health of the connections between members (Cross & Parker, 2004:9). CoPs will be further discussed in detail in Chapter 3 as a method for enabling knowledge sharing in organisational settings.

In the next section, Patti Anklam, a researcher, author and well-respected KM practitioner, expresses her views on how to benefit from organisational networks.

2.9.2 How to benefit from organisational networks

Prior scholars have detailed and discussed the many benefits of organisational networks (*cf* Seetharaman *et al*, 2004:522; Anklam, 2007:22-26; Chiucchi, 2008:217-228; Boer *et al*, 2011:94-95; Grant, 2013:97; Adachi *et al*, 2013:10-13; Durugboa *et al*, 2013:598-608; Montemari & Nielsen, 2013:540-541; Wang & Chen, 2013:866). Anklam (2007) provides a practical guide to creating and sustaining networks at work and explains the benefit of organisational networks lies in the following:

- The quality of tacit interactions, especially in advice-seeking and problem solving interactions (Anklam, 2007:22); in this scenario, knowledge is exchanged between parties and embodies the 'instrumental relation' type referred to earlier on in Section 2.2.2
- Access to the flow of information, knowledge and experience to anyone in the network that needs it (Anklam, 2007:25); in this scenario, knowledge is transferred from the sender to the receiver
- The creation of "resilient, innovative and cohesive" groups and teams (Ankam, 2007:26); in this scenario, knowledge is created in the groups

Anklam (2007:26) further explains resilience, innovation and cohesion as follows:

- Resilience refers to the ability to survive and thrive in the face of change whether it is created internally or externally forced in the organisation
- Innovation refers to fostering a free flow of ideas and interactions among employees; by way of an example, solving a multi-functional and multi-dimensional problem to develop a new product, would require employees' collective diverse knowledge, experience and expertise – it may even require that employees tap into their own personal external connections to solve the problem
- Cohesiveness refers to working collaboratively in networks and using participative technologies (for example, Web 2.0), to have fingertip access to everything that the network knows and shares; even without technology, a well connected network has access to the creative knowledge that makes the sum of a network better than its individual parts

In spite of the above organisational network benefits, Anklam (2007:22) asserts that rigid hierarchical organisational structures are not outmoded, nor are informal networks particularly new. Different network forms co-exist and will continue to do

so. Corporate leaders must simply learn to acknowledge both organisational forms and manage them in order to maximise the performance of work activities in their organisations. This is possible because organisational networks support the flow, sharing and creation of information and knowledge between the various role-players in corporate networks.

2.10 Key role-players present in corporate networks

When viewing a full network diagram (sociogram or sociograph), three key roles can be identified; the central connectors, the brokers, and peripheral members. Below is an example of such a network.

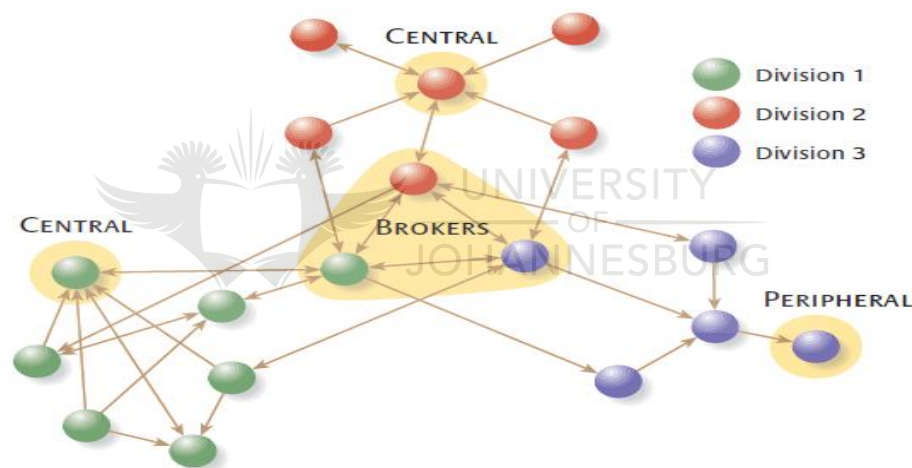


Figure 2.2: Key role-players present in corporate networks
(Parise, Cross & Davenport, 2006:33)

In the above diagram in Figure 2.2, it can be observed that central connectors are the core of a network. Employees regularly seek them out for advice. Brokers on the other hand, are those who have ties across sub-groups and therefore serve to integrate the entire network. In the example diagram, there are three brokers represented from each division that act as bridges across the three divisions. It should be noted that some employees can serve as both central connectors and brokers in a network; however, Figure 2.2 does not illustrate such incidence. Instead

it clearly portrays peripheral players, those who reside on the boundaries or are isolates of a network and are infrequently sought for advice from their co-workers.

A detailed discussion is given below to gain a deeper understanding of the dynamics each role plays in the network, as well as evaluate the loss of knowledge that may occur if these employees leave their organisations.

2.10.1 Central connectors

Central connectors, also known as central prominent players or hubs of a network, often have the most direct connections in a network and by virtue of this have substantial influence in their networks (Parise *et al*, 2006:33). Employees regularly seek them out for information and advice because they have a great deal of technical expertise in one or more areas. Because of the help they provide others, central connectors have a strong awareness of the expertise in the network and if the central connector does not know the answer, they will know who to ask. With their depth of expertise and influential position in the network, central connectors often pose two key knowledge risks.

2.10.1.1 First key knowledge risk

The first key knowledge risk lies with the "deep, networked-embedded technical expertise" critical in the day-to-day operations and in times of crisis (Paris *et al*, 2006:33). Employees seek out central connectors to obtain subject matter expertise – also known as 'deep smarts' – whose expertise is based on experiences, intuitive judgements and the ability to analyse problems from different viewpoints. Moreover, central connectors are trusted by their peers, have credibility, and are willing to help their colleagues because of their vibrant strong relationships. They are also the first to be called upon when things go awry because they can handle crisis situations (Parise *et al*, 2006:33). By inference, remove central connectors from the network and the network collapses and the organisation suffers in its business continuity

efforts. Organisations should therefore encourage central connectors to lead formally recognised CoPs around their areas of expertise in order to help transfer and share some of their subject matter expertise to less knowledgeable employees.

There are also other ways for central connectors to share their knowledge. For example, central connectors could lead peer assists where less experienced employees solicit the advice of central connectors before they start a project or work assignment. Alternatively, when the project is completed, central connectors can conduct AARs and the output generated from this can be used to capture the lessons learned for inexperienced employees to learn from (Anklam & Hutchinson, 2005:72). These and other knowledge sharing approaches will be discussed in more detail in Chapter 3.

2.10.1.2 Second key knowledge risk

The second key knowledge risk posed by a central connector lies with "transferring organisational memory and getting newcomers up to speed" (Parise *et al*, 2006:34). Connectors have knowledge of an organisation and its past that helps productively engage newcomers, as well as avoid repeating the same old mistakes that central connectors made. New hires get connected and productive in an organisation by becoming embedded into the network. Unfortunately, most orientation programs focus heavily on policies and processes, while relying on chance encounters to get a new employee productively embedded into a network (Parise *et al*, 2006:34).

Firstly, what this means is that the newcomer's expertise and skills is rarely known to the rest of the network. The central connector, however, can help by directing staff to these peripheral newcomers and informing others about their expertise and abilities. Secondly, the newcomers are often not trusted or deemed credible by the network. Again, the central player can help by vouching for a newcomer's abilities; and thirdly, although newcomers might have many great ideas, they rarely have the insight into the norms, politics and working practices of the organisation. In other words they are

not yet accustomed to the organisational culture and thus the central connectors are the best advisors to guide newcomers in this regard (Parise *et al*, 2006:34).

Against this background, one may infer that central connectors are instrumental players in sharing and transferring their knowledge to both their colleagues and to new hires in the organisation. Notably, what stands out is that through knowledge sharing, employees are afforded the opportunity to learn mutually from one another (Reinholt, Pedersen & Foss, 2011:1277). Central connectors thereby, reduce the burden on themselves to share their knowledge continually and help develop other less-connected employees' knowledge in ways that embed them more firmly into the social fabric of an organisation.

2.10.2 Brokers

Brokers – also known as bridges – are people who have ties across sub-groups in a network and help break down the silos driven by formal organisational structures, deep expertise or by occupational sub-cultures. They may not have the most ties in a network but by virtue of key relationships across sub-groups, they have a unique understanding of the resources of expertise embedded in the network. They are able to transfer knowledge, ideas and understanding from one group to the other and integrate disparate expertise in order to capitalise on opportunities. Brokers are positioned in areas where collaboration is most important and where integration between groups would benefit the organisation (Parise *et al*, 2006:35).

When brokers leave, they might not directly affect as many people as central connectors, but their absence fragments the networks at key junctures. The unique opportunities based on integration of expertise are lost and so is the ability to coordinate effort among employees with different norms and values (Parise *et al*, 2006:35). Many organisations do not even know what has been lost when brokers leave. To avoid getting caught off-guard, Parise *et al* (2006:36) suggest that organisations put three practices in place to help them identify, develop and position brokers in the network, namely –

- 1) Organisation can encourage and reward lateral movement for employees across geographical locations, projects and divisions through job rotations
- 2) Organisations can groom potential brokers by performing ONA and seeing who currently plays the role of a broker in the organisation; once identified, brokers can be trained to integrate networks by establishing contacts in multiple groups, understanding the needs of each group and spotting opportunities through the transfer of ideas and knowledge
- 3) Organisations should position brokers where their skills can be deployed in ways that move ideas from concept stage to actionable results integrating groups more tightly

While the absence of central connectors directly affects the organisation, the absence of brokers is less direct though it has the same negative impact in that networks become fragmented (Parise *et al*, 2006:35).



2.10.3 Peripherals

According to Parise *et al* (2006:36) peripheral employees have the least number of connections and often reside on the boundaries of a network. Employees on the periphery tend to be more disengaged and dissatisfied with the organisation than those who are well-connected, and as a result, are more likely to exit the organisation they work for. Also, because they are on the periphery their knowledge tends to be side-lined. They are not as visible within the company as central employees or brokers are, and as a result they are usually ignored when it comes to retaining their knowledge. However, peripheral employees possess two types of important knowledge, namely 'niche expertise' and outside knowledge resulting from their 'external network contacts'.

2.10.3.1 Niche expertise

Parise *et al* (2006:37) explain that although niche expertise may not be important in the execution of daily operational activities, the expertise of peripheral employees is employed when crisis situations arise in the business. Peripheral employees also tend to have novel insights and innovative abilities to solve problems. Because they are not immersed into existing paradigms of thought, their current ways of working are not to the same degree as that of central connectors. They tend to combine novel perspectives with an understanding of the inner workings of an organisation to generate feasible innovations.

Moreover, new and innovative ideas are also at risk of loss when peripheral employees depart because they are often the 'early adopters' in the organisation (Parise *et al*, 2006:37). Therefore, organisations should always consider retaining some of these employees in their knowledge retention programmes. For example, in order to get peripheral employees' ideas into action, connect them with more connected members such as brokers in the network to stimulate an overall increase in connectivity in the network. Connectivity suggests that it takes only a few changes in the network to impact the increase in the cohesion of the network, that is, reduce the average distance for information to travel across the entire network (Parise *et al*, 2006:37).

Another management practice to ensure peripheral employees are not disengaged or disinterested in their work, is to get them involved in activities that make them feel connected to the organisation, while at the same time making others aware of the expertise they possess. This may include encouraging mobility across projects so the employees are not stuck on the same project forever, thereby allowing the peripheral person to experiment and bring in new ideas. Parise *et al* (2006:36) also suggest making peripheral workers visible by giving them the opportunity to do teleconferences and "lunch-and-learn" sessions on work they are doing. Finally, peripheral people, especially newcomers, can be encouraged to join a CoP. This gives them the opportunity to meet people who have similar interests and keep them

engaged especially if they are not happy with their formal work assignments (Parise *et al*, 2006:37).

2.10.3.2 External network contacts

Although peripheral employees may not be well-connected within their own organisations, it is a mistake to assume they are not part of an extensive network outside of their immediate work group or organisation. Therefore, a much less obvious source of knowledge loss risk comes from external relationships, such as in direct customer-facing groups, vendors, academics, independent research centers, and colleagues from previous jobs are all sources of important external knowledge. Often the departing employees take their external contacts with them as they walk out the door. According to Parise *et al* (2006:38), the loss to the organisation could be deep insights about markets, technologies, products, and an understanding of customer requirements.

In addition, external relationships are also a source of new ideas, thus helping to keep the organisation from becoming too insular in its thinking. For example, in a pharmaceutical company, new ideas flow into the organisation to help with their drug discovery program; however, because the peripheral person is not well-connected internally, sometimes these new ideas may not be leveraged by other employees in the organisation as a whole (Parise *et al*, 2006:37).

Relationship network knowledge is therefore at risk of loss if the peripheral employee decides to leave the organisation. Companies can formalise these hidden external relationships by encouraging the peripheral employee to invite his or her external contacts to conduct workshops, give presentations, or sit in on meetings to provide feedback. In this way, more connections will be established between employees in the organisation and the external contact (Parise *et al*, 2006:38).

Another effective approach is to ask peripheral employees to document their external contacts and reward individuals if they bring their external contacts and their

expertise into the organisation. For example, a pharmaceutical company rewarded scientists who published papers jointly with external colleague(s). Or, by recognising and rewarding joint sales efforts, an organisation is encouraging the sharing of external relationships versus a "go it alone mentality to maximise personal monetary commission and recognition", says Parise *et al* (2006:38).

Scholars Parise *et al* (2006:31-38) are supported by various others in the literature emphasising the importance of identifying, leveraging and rewarding the knowledge sharing efforts of organisational network players; central connectors, brokers or peripheral employees alike (*cf* Smith & Mireles, 2010; Tagliaventi, Bertolotti & Macri, 2010; Wang & Noe, 2010; Young, 2010; Jeon, Kim & Koh, 2011; Kim *et al*, 2011; Reinholt, Pedersen & Foss, 2011).

2.11 Summary

The above overview of the fundamental theories, history and principles of social networks and social network analysis is part of the literature review of this study. In summary, by combining SNA – and more specifically ONA – with an organisation's knowledge sharing, transfer and retention programs can help organisations to identify and retain critical knowledge to avoid crises in their business continuity efforts. Fundamentally, a network perspective allows an organisation to locate key role-players such as, central connectors, brokers and peripheral employees, and to focus on its knowledge retention strategies through knowledge sharing programs. Examples of knowledge sharing programs include CoPs, peer assists, AARs and storytelling. Chapter 2, therefore effectively responds to the sub-problem, namely-

What is SNA and how can the SNA output be used to ignite knowledge sharing initiatives?

In Chapter 3, the different knowledge sharing initiatives are discussed in more detail within the KM realm. The review of the literature on social network analysis and knowledge sharing initiatives in corporate environments continues.

Chapter 3

Knowledge sharing initiatives in corporate environments

3.1 Introduction

In today's knowledge-based economy, the business environment is more competitive and uncertain than in the past. In order to succeed, organisations must utilise their employees' expert knowledge. Expert employees imply the key network role-player employees referred to in the previous chapter to rapidly create products and services for their customers. Moreover, since not all employees have expert knowledge, skills, abilities and competencies, organisations must consider a variety of knowledge sharing methods and techniques to identify, capture, share and transfer knowledge from their 'expert employees' to novices or less experienced employees (Davenport & Prusak, 1998; Yang, 2008:345; Hsu, 2008:1316; Wang & Noe, 2010:115).

In the realm of knowledge management (KM), knowledge sharing is one of the most fundamental activities through which employees – especially key network role-players – share their knowledge within and across teams in an organisation (Wang & Noe, 2010:115). According to Ramasamy and Thamaraiselvan (2011:279) the power of sharing knowledge enables employees to communicate their information, expertise, experiences, lessons learnt, opinions and insights with one another thereby affording them the opportunity to perform better in their jobs.

In addition to enhanced employee performance, organisations that exploit their existing knowledge-based resources are able to apply employees' knowledge in innovation areas. For example, due to the utilisation of employees' knowledge, the faster is the rate of completion of new product development projects and the faster new products are introduced and delivered to the market, thereby realising new revenue growth streams for the organisation (Wang & Noe, 2010:115).

Given the potential benefits that are realised from knowledge sharing activities, this chapter explores the different methods in which knowledge is shared among employees in existing social networks of the organisation. Key network role-players, namely central connectors, brokers and peripheral players previously discussed can also be referred to as 'knowledge sharing agents'. Key knowledge sharing agents (mentioned in the title of the thesis)² enable the effective execution of knowledge sharing in the organisation by utilising a number of knowledge sharing methods described in the literature.

However, before proceeding with the above discussion, this chapter first examines the fundamental concepts of what knowledge is and how it interrelates to knowledge sharing.

3.2 What is knowledge?

According to the online version of the Oxford dictionary (2013) knowledge is defined as either –

- 1) Facts, information, and skills acquired through experience or education; the practical understanding of a subject, or
- 2) Awareness or familiarity gained by experience of a fact or situation

Notably, what is emphasised here is the term 'experience' gained by an individual. Moreover, Davenport and Prusak (1998:5) refine the term 'experience' in their knowledge definition by saying –

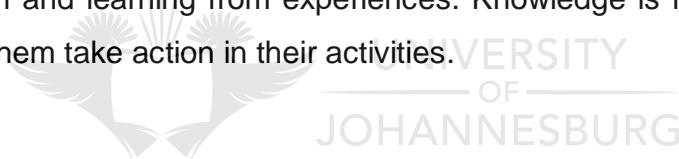
Knowledge is a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information.

2 After careful consideration as to whether the title should read: Corporate advisory networks of knowledge sharing facilitating agents, it was decided instead that the concept 'agent' implies both the action of sharing information as well as the action of facilitating the sharing of knowledge. Both these meanings are of importance and should be read into the title of the study.

In the above definition, new knowledge is thus incorporated and added to the mind of an individual's existing frames of past experiences.

April and Izadi (2004:8) define knowledge based on the term 'information', and state that "knowledge is applied information". Similarly, Drucker (1988:47) says that knowledge results when the intellect (the capacity to think) does purposeful work using data and information. Data is viewed as discrete specific facts and figures whilst information is regarded as data that is organised to reveal trends. Saint-Onge (1996:14) concurs with the above statements and describes knowledge as "the precursor to effective action".

Although there is no single agreed definition for knowledge, cumulatively, the above definitions imply that knowledge changes human behaviour, is purposeful and is related to action and learning from experiences. Knowledge is rudimentarily tied to people to help them take action in their activities.



3.2.1 Dual nature of knowledge

In addition to the given definitions, the nature of knowledge exhibits duality. Knowledge can be represented as either explicit or tacit according to the degree in which people can share it easily with one another. Explicit knowledge (know-what, facts), typically refers to the knowledge that can be easily expressed in words or in a document. It is packaged as information and turned into reports, articles, manuals, patents, pictures, images, video, sound and software. In contrast, tacit knowledge (know-how) is vague and is not easily expressed, because it is experience-based (Borghoff & Pareschi, 1997:836; Yang & Wu, 2008:1130).

Also, tacit knowledge is described as 'sticky' because it is rooted in the context in which it develops, whilst explicit knowledge is considered as 'leaky' because it can be spread. This suggests that explicit knowledge can be acquired and transferred by

means of rules and norms embedded in the explicit information, whilst tacit knowledge is acquired and transmitted through the interactions between individuals, such as sharing of practices in joint work activities or through face-to-face dialogue discussions (Tagliaventi *et al*, 2010:332; Yang & Wu, 2008:1130).

3.2.2 Knowledge conversion process

Both tacit and explicit knowledge are not independent but mutually complimentary elements. To better appreciate the dual nature of knowledge, the process of knowledge conversion between individuals and organisations needs to be explained. One of the main theories explaining the conversion process is known as SECI theory. According to Yap, Rosmaini, Muhamad and Norazlin (2010:4) SECI theory can be expressed as "the interaction between tacit and explicit knowledge". This interaction within the conversion process is made up of four stages, identified by Nonaka and Takeuchi (1995) and termed SECI (socialisation, externalisation, combination and internalisation), illustrated in Figure 3.1 below.

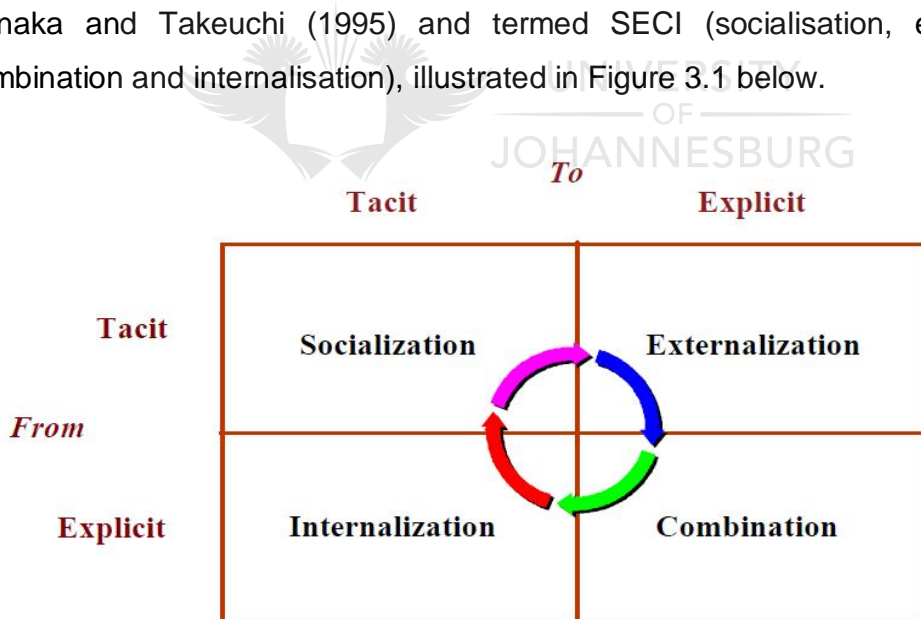


Figure 3.1: The conversion process: interaction between tacit and explicit knowledge (Nonaka & Takeuchi, 1995:62)

In the SECI theory, the stages are triggered spirally in a clockwise manner, from the socialisation stage to the internalisation stage, to support the knowledge spiral

process of knowledge creation and sharing which over time is inculcated into the organisational culture. The main idea of the spiral is the sharing of an individual's knowledge with others and eventually acquiring new knowledge from others (Nonaka & Takeuchi, 1995:62; Nonaka & Konno, 1998:40-50).

The process that transfers tacit knowledge in one person to tacit knowledge in another person is known as the socialisation stage. It is experiential, active and alive; it involves sharing knowledge by interacting directly with colleagues inside the organisation and with clients and vendors outside the organisation (Nonaka, 1997; Nonaka & Konno, 1998:44; Lilleore & Hansen, 2011:121). Socialisation, therefore is primarily mutual knowledge sharing and transfer process wherein key network role-players (employees), share knowledge because they are embedded in the social networks of the organisation (Wang & Noe, 2010:122). Cross-functional teams or communities of practice (CoPs) represent the socialisation stage (*cf* Section 3.7.1).

The second stage in SECI theory involves the process of making tacit knowledge explicit and is known as the externalisation stage (Nonaka, 1997). Externalisation is the publishing and articulation of knowledge which becomes embedded into organisational artefacts. For example, the central connector or peripheral specialist role-player could articulate their own tacit knowledge through words (written document or presentation), metaphors or images to an audience. A second example could entail the eliciting, harvesting and documenting of the tacit knowledge of key employees (that is, key network role-players in the organisation, for example, central connectors, brokers and peripheral players). Dialogue is an important mechanism through which sharing and transfer occurs in both examples. During face-to-face communication, the network role-players share their beliefs and learn how to better articulate their thinking process through the instantaneous feedback received from their audiences, namely, colleagues (Nonaka, 1997; Nonaka & Konno, 1998:51; Lilleore & Hansen, 2011:122).

The third stage follows once the tacit knowledge has been made explicit (externalised) through dialogue discussions. Now, the explicit knowledge could be translated by the key network role-players into a readable, understandable document or an audio/visual-presentation. This is known as the combination stage, and entails for example, that network role-players edit their presentations or documents after considering the input and feedback received from their colleagues. In this scenario, one may use information technology, such as databases, email systems and document management repositories to store these documents and presentations (Nonaka, 1997).

The final stage of the conversion process is known as internalisation and this involves employees understand and absorb the explicit knowledge (for example, the key role-player's presentation), embed it in their minds, and apply the newly absorbed tacit knowledge. Knowledge in the tacit form is actionable by the owner, that is, the owner can actualise the knowledge concepts through actual doing (Nonaka, 1997). For example, employees could access the presentation prepared by the key role-player and apply it accordingly to their own context-specific situation. Fundamentally, the internalisation process transfers explicit organisational knowledge back to the individual (Yap *et al*, 2010:4-5; Lilleoere & Hansen, 2011:122; Yang & Wu, 2008:1130).

The above discussion provides only a snapshot of the dual nature of knowledge and the intricacies of the knowledge conversion process. Nonaka and Takeuchi's SECI theory has often been applied in KM since 1995, yet the literature review reveals a growing interest in investigating and improving knowledge sharing in organisations.

3.3 Knowledge management and knowledge sharing in organisations

There is still no one single definition that describes KM completely. However, among several definitions there is some consensus that KM generally refers to how organisations create, store, retrieve, share, apply and regenerate knowledge (Hong

et al, 2011:14417; Kim, Suh & Jun, 2011:14633). Knowledge sharing is the most critical success factor of all KM activities because effective knowledge sharing practices make knowledge available to other individuals within the organisation to re-use and regenerate knowledge (Hong *et al*, 2011:14417). What this means is that knowledge which is held by an individual is converted into a form that can be understood, absorbed and used by other individuals and they in turn regenerate new knowledge to be shared with other individuals. Knowledge therefore is disseminated and recreated across the organisation.

The above inference is further acknowledged by Babu and Gopalakrishnan (2008:20) and Hsu (2008:1316) who explain that knowledge sharing refers to the activities of individuals and groups of transferring or disseminating knowledge from one person, group or organisation to another person, group or organisation. Hong *et al* (2011:14417) add further that knowledge sharing occurs within a social context. The voluntary sharing of individual knowledge results in knowledge distribution, which may contribute to knowledge acquisition by other individuals. The act of sharing knowledge therefore contributes not only to individual learning, but also to organisational learning as many individuals can learn from one individual's shared knowledge (Hong *et al*, 2011:14418).

Wang and Noe (2010:117) concur with the above explanation, and emphasise that in the organisational knowledge sharing process, key employees (that is to say, key network role-players) in the organisation can provide task information and know-how to help co-workers execute their work activities and to collaborate with them to solve problems, develop new ideas and implement work policies and procedures. This sanctions the legitimacy of social networks in organisations, wherein knowledge flow is driven by communication processes and information flows between the knowledge providers and knowledge seekers (Hong *et al*, 2011:14418).

A further feature relating to the dimension of knowledge sharing in social networks or in a social context is the effect of the strength of the relations in networks. Boer *et al*

(2011:98) recall the research of Hansen in 1999, who found that tie strength was associated with the type of knowledge new product development teams shared. Weak ties were characterised by infrequent and distant relationships, and this facilitated team members to search for knowledge in other business units whilst strong ties – in other words, frequent and close team member interactions – enabled the transfer of complex knowledge and the reduction of time to complete the new product development projects.

Aside from the social aspects, Ackerman, Pipek and Wulf (2003:3-9) add a further dimension to the concept of knowledge sharing and claim that three types of knowledge sharing occur in organisations, namely knowledge retrieval, knowledge exchange and knowledge creation. Knowledge retrieval means that the main feature of knowledge sharing between organisations and individuals is the means to retrieve existing organisational knowledge. Knowledge exchange is the means to exchange personal knowledge between individuals in the organisation whilst knowledge creation is to generate new knowledge from knowledge sharing, resulting in new combinations of existing individual and shared organisational knowledge.

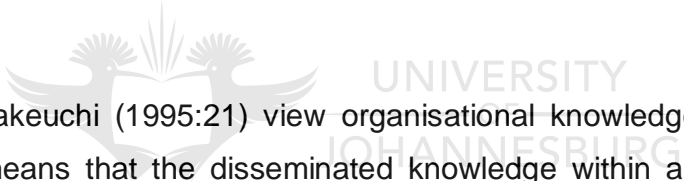
Although there is wide agreement that knowledge sharing occurs within a social context, a great deal of KM implementations put a heavy emphasis on knowledge delivery through technology. Knowledge sharing is about people interacting and the paradigm of KM is shifting from technology-driven to a people-driven approach whereby knowledge sharing is characterised by a conversational approach within a formal or informal social context. Technology is used only as the platform to encourage social interaction (Hong *et al*, 2011:14417).

Against this background, it can be said that knowledge sharing is basically the act of making knowledge available to others through the transfer or dissemination of knowledge from one person or group to another. It can also be said that the knowledge held by one individual can be amplified, internalised, applied, shared and regenerated by others provided that environments are created within organisational

settings to enable individuals to interact with one another and share organisational knowledge.

3.4 Organisational knowledge

Up to this point, this chapter has referred to organisational knowledge sharing but has not defined the term 'organisational knowledge' properly. To organisations, knowledge is defined as what employees know about customers, products, work processes, and the lessons learnt from the failures or successes of their work experiences (April & Izadi 2004:8). When the knowledge is shared within organisations, it multiplies and becomes embedded in the routines and norms of the organisation and in the work practices and minds of its employees. What this means is that all forms of applied organisational information is in actual fact organisational knowledge applied in the minds of its knowers, that is, employees in organisational settings.



Nonaka and Takeuchi (1995:21) view organisational knowledge as "justified true belief" which means that the disseminated knowledge within an organisation has been established through the tests of proof. Knowledge guides organisational members (employees) in their judgments and work decisions, which helps employees improve their job performance and subsequently helps the organisation gain competitive advantage and efficiencies over other organisations (Hsu, 2008:1318; Wang & Chen, 2013:873). To gain competitive advantage, companies need to overcome the barriers to knowledge sharing and understand the relational antecedents to organisational knowledge sharing.

3.5 Relational antecedents to organisational knowledge sharing

The social context to organisational knowledge sharing has been mentioned above, but the antecedents to relational knowledge sharing and seeking advice have not yet

been disclosed. According to Anklam (2005:541) there are four relational dimensions that underpin effective knowledge flows in organisations; these are –

1) *Awareness of the knowledge of what others know*

This means employees must be aware of who knows what and who is working on what within the organisation.

2) *Access*

It is not enough to know what other employees know; there must be a way to access to them in a timely fashion. This denotes that to reach others, the organisational structure must support formal and informal social networks, physical proximity and/or the use of technology to connect employees.

3) *Engagement*

Knowledge is shared through dialogue and personal interaction. Key knowledgeable employees (key network role-players) must be willing and able to share their knowledge and transfer it to others.

4) *Safety*

Given the awareness of what others know, access to them and ability to engage with them must feel stress-free. The ability to feel safe when seeking help or advice is important. In a 'safe' relationship, employees are able to admit their lack of knowledge and solicit the required advice and assistance from others.

In considering the above relational dimensions that underpin knowledge flow, the barriers to knowledge sharing in organisations should be removed to further create favourable knowledge sharing environments.

3.6 Barriers to knowledge sharing in organisations

Given the antecedents discussed in the above section, some of the potential barriers to knowledge sharing are identified in this section. Babu and Gopalakrishnan (2008), Hong *et al* (2011), and Jaegersberg and Ure (2011) are among the scholars giving a

detailed account of the barriers to knowledge sharing in organisations. The barriers can be divided into three categories, namely, individual barriers, organisational barriers and technological barriers.

The individual barriers identified by Babu and Gopalakrishnan (2008:22-23), cover the following aspects:

- General lack of time to share knowledge by employees and time to identify colleagues in need of specific knowledge
- Apprehension and fear of sharing knowledge by key experienced employees may jeopardise the key employees' job security
- Lack of contact time and interaction between knowledge experts and knowledge seekers
- Lack of trust in knowledge seekers because they may take unjust credit for the knowledge provided by the knowledge experts

All of the above individual barriers could be overcome by inculcating and supporting formal and informal social structures where key employees, that is, key network role-players, motivate other employees to build trusting strong relations embedded in the organisation's DNA.

Organisational barriers relate to the following challenges (Babu & Gopalakrishnan, 2008:23):

- The KM strategy and sharing activities are not sufficiently integrated into the organisation's goals and strategic intent
- Lack of leadership in clearly communicating and managing the benefits of knowledge sharing practices
- Shortage of formal and informal spaces to reflect and share knowledge
- Lack of transparent rewards and recognition systems that motivate employees to share their knowledge

- Physical work environments and layout of work areas inhibit a sharing culture
- Competitiveness between functional areas or business units
- Communication and knowledge flows are restricted because of hierarchical top-down structures

The above organisational barriers can be addressed if the organisation's senior leadership recognises the importance of creating conducive work sharing environments supported by social networks in organisational structures.

Technology barriers, mentioned by Babu and Gopalakrishnan (2008:23-24), include:

- Lack of integration of work processes with IT systems impedes the way employees collaborate, store and retrieve information
- Lack of technical support when collaborative IT systems are down or IT systems obstruct work routines and communication flows between employees
- Lack of communication and training regarding employee familiarisation to new collaborative IT systems

Once again, the above technical barriers can be resolved if key network role-players lead and motivate employees on how to utilise the different IT systems to store, retrieve, re-use and apply information in their work practices, as well as populate the IT systems with information when new knowledge is generated.

Removing the barriers to knowledge sharing as discussed above, will help shift the organisation's focus to improving knowledge sharing methods and techniques.

3.7 Knowledge sharing methods and techniques

With the barriers removed, employees identified as key network role-players in the organisational network analysis (ONA) can act as knowledge sharing agents to start-up, lead and manage collaborative sharing methods and techniques in the organisation. The discussion in this section unfolds against the background provided in Chapter 2 of central connectors, brokers and peripheral players (*cf* Section 2.10). An overview of four knowledge sharing methods and techniques, namely CoPs, after action reviews (AARs), peer assists and storytelling follows next.

3.7.1 Communities of practice

The concept of the CoP was first introduced by pioneers Lave and Wenger in 1991 through their study on apprenticeship as a learning model (Jeon *et al*, 2011:12423-12424). They found that in the master-apprentice relationship, the apprentice becomes a member of the profession's community by learning, seeking advice and sharing life with the master to learn the profession gradually.

The concept of CoP has evolved from the apprenticeship model to the social context model point where collaboration and social interaction among individual workers in a CoP, results in maximised learning. As an example, service personnel at Xerox were not satisfied by the standard context-free training programs and instead learned about their work through sharing work-related knowledge with their colleagues in informal voluntary community interactions (Jeon *et al*, 2011:12424). Moreover, a CoP can resolve issues and challenges an organisation faces.

Researchers Wenger, McDermott and Snyder (2002:4) in their studies defined CoPs as –

[G]roups of people who share a concern, a set of problems or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an on-going basis.

Given the above explanation of what CoPs are about, one can propose that the central connector is in a unique position to use their established network(s) to start-up CoP(s) and lead these communities by facilitating regular meetings where network members – who can also be known as community members – interact with each other and participate in knowledge sharing activities. Moreover, network members who are less skilled and experienced or novice employees may seek advice from the central connector, whilst network peers with similar skill and knowledge as the central connector may simply have productive conversations and knowledge exchanges, thereby enhancing each other's knowledge base.

In order for the central connector to purposely design CoPs, three crucial elements need to be considered, namely, the domain, the members of the community, and the practice (Young, 2010:36). Firstly, the domain has an identity defined by a shared domain of interest. Membership to this group implies commitment to the domain and a shared competence that distinguishes members from other employees in the organisation. Members value their collective competence and learn from each other (Young, 2010:36).

Within the domain of interest, community members (network members) engage in joint activities and discussions, help each other, give advice freely and share information to form the community. Members build relationships that enable them to learn from each other. Young (2010:36) emphasises that a relationship based on trust between members encourages frequent interactions to share and develop common knowledge albeit the members do not necessarily work together on a daily basis.

Secondly, members of the CoP are practitioners. They develop a shared repertoire of resources, such as concepts, tools, models, procedures and ways of addressing, advising and resolving recurring problems. And, thirdly, these resources are in fact a shared practice which takes time and sustained interaction to develop (Young, 2010:36).

Aside from the three elements, the central connector needs to nurture CoPs by attracting and keeping CoP participants involved (Young, 2010:36). For example, the central connector could invite network members (that is, community members, participants, network employees) to regular CoP meetings, where the central connector or other network members present or share their experiences in the form of stories, lessons learned or problem-solve on domain topics that interest network members. At the meetings, members ask questions to clarify their understanding of the topic in question and in this process knowledge is exchanged and shared. The central connector, therefore, fundamentally creates opportunities for engagement and sharing of knowledge in the domain of the CoP. Over time, the community accumulates knowledge (that is, the repertoire of knowledge) which can be codified into documents and shared via IT systems such an intranet portal, database or email (Young, 2010:36).

Against this background, the central connector together with the core group (the core group is the central connector's closest network ties), would need to strategically and purposely design the CoP by considering the three elements discussed above together with the following questions outlined hereunder (Young, 2010:37):

- What would the strategic context and goals of the CoP be?
- What value would the CoP bring to the organisation?
- What key advice or knowledge would be shared, created and re-used by network members?
- Who would be the potential participants of the CoP? Would it include only network members identified in the ONA or would the participations need to extend to a broader enterprise audience?
- What knowledge sharing methods would be held by the CoP to sustain the vigour and interest of the community?
- How frequent and where would community members meet and interact?
- What type of senior management support would be required?

After the above questions have been addressed, the central connector together with the core group could set forth their endeavours to establish the CoP officially in the organisation. The business case for initiating the community could be written-up based on the responses of the questions outlined above and submitted to executive leadership for approval. Once approved, the community could be officially launched into the organisation.

Sandrock (2008:61) explains that the launch is the first phase of the community cycle. There are three other phases that follow after the launch. The second phase is the developing stage where membership is growing and activity in the community is on the increase. The third phase is the mature phase when community contributions are steady and the goals of the community are being achieved. The fourth and final stage is the dissolved stage. The community has achieved its objectives, activity has ceased and all knowledge has been recorded and captured in an IT database system for future re-use.

3.7.2 Peer assists



A peer assist is a technique used by a project team to solicit advice and help from peers, such as brokers, and subject matter experts (SMEs), such as central connectors and/or peripheral specialists (that is, employees who are not part of the project team). For example, British Petroleum (BP) use peer assists to gather knowledge before embarking on a project. The project team gains project insights from their peers and SMEs whom have had similar experiences in the past (Young, 2010:16).

Young (2010:16) states that by carrying out the peer assist, the learning curve of the project team is reduced because by tapping into the experience and knowledge of their peers, the team can respond with ease to complex project issues and resolve difficult problems. This technique is valuable as it yields immediate insights and results to the project team.

In order to conduct a peer assist, Young (2010:16-17) suggests the following guidelines relating to before, during and after the meeting:

Before the meeting

- The project leader initiates assistance from peers and SMEs and schedules a meeting. The meeting agenda could include the following items:
 - agenda topic, project or work assignment details, issues and concerns
 - scheduled date, time and venue
 - the participants involved
 - the objectives of the meeting
 - recommendations
- It is important to provide time for the peers and SMEs to think through the project issues and recommendations on their own before reconvening them again to discuss the recommendations. Hence, it is preferable that the meeting be scheduled in two parts, either on the same day or over two days. The peer assist meeting could therefore last from half a day to two days.
- It is difficult to have in-depth discussions if the peer assist group is too large. Limit the number of peers and/or SMEs to no more than six individuals at a time.

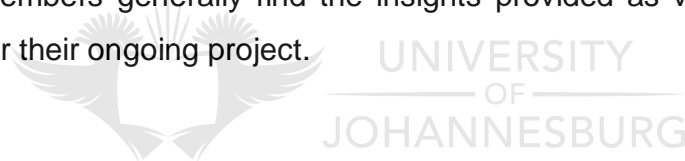
During the peer assist meeting

- The project leader could facilitate the meeting. A leader who dominates the meeting should refrain from facilitating the meeting and rather use a skilled facilitator to facilitate the meeting.
- The objectives of the meeting must be clear and specific. Any deviations from the objectives should be avoided.

- The facilitator provides peers and SMEs with background information and the project objectives. This will help them contribute effectively if they understand the history and objectives of the project.
- Ensure that all the project team members are present at the peer assist meeting. If the project team is too large, then have representatives. Each team member or representative should have the opportunity to ask questions, respond and discuss issues with their peers and SMEs.

After the peer assist meeting

- The project team needs to summon a meeting so as to review what team members have learned from the peer assist meeting.
- The project team is not obligated to use the suggestions and recommendations provided by peers and SMEs. However, team members generally find the insights provided as valuable information for their ongoing project.



3.7.3 After action reviews

The AAR is a simple method used to evaluate the lessons learned by team members (that is, employees working in teams) from their past successes and failures on work activities that have been completed. It is an opportunity for a team to reflect for example on a completed major project milestone, activity, event or task so that next time they can do better and improve their performance. The project team can also document the lessons learned and make it available to the rest of the organisation to improve decision-making, replicate successes and avoid repeat mistakes (Sandrock, 2008:47; Young, 2010:20).

AARs can also be applied to existing social networks or CoPs. The central connector employee has many network connections in the organisation and given their prominence position can influence and motivate their connections to participate in

AARs so that employees reflect and learn from their past work experiences. The AAR can be conducted either as soon as a project has been completed or straight after achieving a major work milestone. A meeting is called by either the central connector or project leader inviting network members in either a CoP or a project team to participate in a facilitation meeting. The central connector, project leader, or independent skilled facilitator utilises their facilitation skills to prompt questions to the invitees with the intention to build consensus on the lessons learned.

Some of the questions suggested by Sandrock (2008:47) and Young (2010:20) are:

- What was meant to happen?
- What actually happened?
- What worked well, and why?
- What didn't work, and why?
- What are the lessons and recommendations that can be used in the future?

The outcome of the AAR session is captured and stored in an IT system where it can be easily retrieved by the project team or other network members who will need to consult it before tackling a similar project (Sandrock, 2008:47).

3.7.4 Storytelling

Storytelling dates back to the origins of human social life in the form of fables and folk stories. In KM, stories can be also known as 'organisational narratives'. Narratives, sometimes referred to as 'war stories', may not necessarily be fully elaborate stories covering plots, characters, actions and events but are simple fragments of stories consisting of a mixture of fact, norms, emotions, rules of thumb, tips, experiences embedded in rich context descriptions, solutions and lessons learned. In the opinion of Sandrock (2008:36), Young (2010:22), and Geiger and Schreyögg (2012:99), narratives are used as a powerful medium to share experiential knowledge that can be transferred with rich context along with content.

The process of telling a story is simple; for example, the SME tells the story by sharing his or her experiences and lessons learned in front of an audience of employees (in a CoP or in existing social networks) who want to gain knowledge. The audience may consist of new peripheral employees who have not yet integrated into the organisation, or younger inexperienced employees who have a lot to learn from experts or employees who did not participate in the projects the SME worked on and are eager to learn from the expert's experiences and lessons (Young, 2010:22). By attending the storytelling session, employees' interest is ignited; they listen, ask questions, learn in the process; and they mingle with other audience participants who have the same common interest. A follow-up discussion to the storytelling topic could ensue, sustaining the network collaborations and learning as is the case in CoPs where regular meetings are held.

Young (2010:23-24) suggests six key guideline steps to be taken in conducting a storytelling session, namely:

- 1) Identify the key strategic critical knowledge areas the organisation is currently looking at
- 2) Through an ONA analysis, identify key SMEs, central connectors or peripheral specialists who have the required knowledge to share and transfer in the organisation
- 3) From the identified SMEs, select a person(s) who has the eagerness, eloquence, willingness and rich experiences to articulate the story or stories to an audience
- 4) Hold the storytelling session in a more friendly and informal atmosphere than a regular meeting environment by changing the layout of desks and chairs and serve snacks and refreshments to create social interactions after the session

- 5) Leverage the output of the storytelling session by capturing the session as a video and posting it on the organisation's CoP intranet for later review
- 6) Add a blog to the CoP intranet page, so that employees can comment on the topic of the storytelling session just held and continue with their collaborative and learning efforts

Organisations, such as IBM, the World Bank and NASA successfully use storytelling to convert central connectors' or peripheral specialists' tacit knowledge into explicit knowledge (DeLong, 2004:51; Steinhauser & Thon, 2008:17-19).

In the realm of KM, many other knowledge sharing techniques are also being applied in organisations worldwide, for example, creative brainstorming, focus groups, knowledge café's, mentoring and coaching to mention a few (Gurteen, 2006; Yap *et al*, 2010; Adachi *et al*, 2013:18-23). The above discussion of knowledge sharing and social network analysis are sufficient and forms the theoretical foundation of the study. This chapter's summary concludes the literature review.

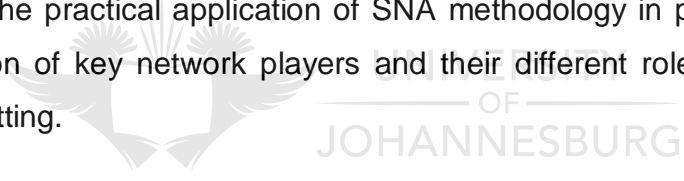
3.8 Summary

In this chapter the principle concepts of KM relating on the dual nature of knowledge – specifically organisational knowledge – and the complexity of knowledge conversion and knowledge sharing are explained. The benefits of sharing are outlined, noting that not all employees in organisations have the same capacity levels of knowledge, skill, experience and expertise. The ONA technique identifies key network role-players in organisations that can serve as SMEs to perform the important role of knowledge sharing agents. They share and transfer their knowledge and expertise across to other employees in established organisational networks to form CoPs. Alternatively, they could simply disseminate their knowledge in the well-established network structures the key role-players are embedded in.

Moreover, the act of sharing and applying a number of knowledge sharing methods (such as CoPs, peer assists, AARs and narrative storytelling techniques) results in consultative advisory interactions to occur and enable complex problem areas in the business to be resolved. Employees' learning curves are reduced, failures are avoided and successes are replicated allowing the workforce to become more productive and efficient resulting in an increase in overall organisational performance. Higher performing organisations are therefore, able to survive and thrive in competitive and economic downturns. Chapter 3, therefore effectively responds to the second sub-problem, namely-

What type of knowledge sharing initiatives can be applied practically in corporate environments?

In the next chapter, the research methodology – specifically SNA methodology – is discussed. Chapter 4 is then followed by a report of the findings of the empirical study, namely the practical application of SNA methodology in performing an ONA and identification of key network players and their different roles in the corporate environment setting.

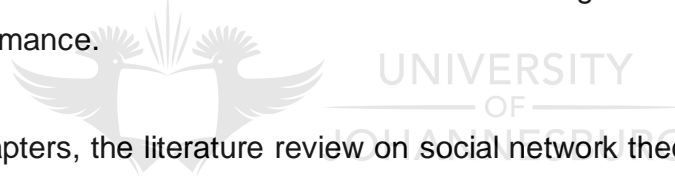


Chapter 4

Research methodology and design

4.1 Introduction

The aim of this study is to use social network analysis (SNA) as a diagnostic tool to surface the informal network engagements of how employees connect and advise each other and solve problems on work matters within a corporate environment setting. The employees who were identified in the SNA as having critical network positions, will be asked to transfer and share their knowledge and expertise through the introduction and deployment of knowledge sharing initiatives. The intention of the initiatives is to educate the workforce of an organisation to respond more effectively and efficiently in their work activities in order to meet organisational objectives and enhance performance.



In previous chapters, the literature review on social network theory, SNA theory and knowledge sharing in corporate environments provided the foundation from which the SNA research could be embarked on. In this chapter, the rationale of the study is reiterated, and the research design and methodology explained.

4.2 Rationale of the study

From the discussions in the previous chapters it is clearly evident that in today's knowledge-based economy, the business environment is more complex, competitive and uncertain than in the past. Moreover, the impact of periodic organisational restructurings as mentioned before in Chapter 1, has forced employees to use their informal work relationships to ask for advice from colleagues in order for them to solve problems, make good decisions and accomplish their work duties successfully.

Moreover, the advice sought by employees from other colleagues exists in three forms. The first form of advice is when the employee contacts a colleague who has a solution to the problem and so the employee receives specific answer(s) to specific question(s) asked. The second form of advice is when the employee does not receive specific answers but finds out about the location of relevant information whether be it in other colleagues or in IT systems, such as databases. This form of advice is called meta-knowledge or information about the location of information and is important to the employee's ability to effectively solve the problem at hand. The third and final form of advice relates to the employee engaging in a problem solving dialogue with a colleague(s) which helps the employee think about the problem in a new way. This "new way", state Cross and Parker (2010:21), implies the problem is reformulated making the problem less complex to understand enabling the employee to solve the right problem (*cf* Section 1.1).

In light of the above forms of advice available and how important it is to seek advice from employees embedded in informal networks to execute on a company's work objectives, a savvy executive in a corporate environment may want to discover the informal network structures operating inside his or her organisation. Once the networks are discovered, the executive may also want to know how the knowledge flows among employees through the networks because understanding the flows will allow the executive to leverage off the networks to facilitate information and knowledge sharing to occur across the entire organisation so that all employees work more efficiently and effectively.

To respond to the above concerns, the current study was undertaken in a corporate setting, or what Mouton (2001:139) calls World 1 in his Three Worlds framework. The Company³ investigated was organisationally structured into seventeen

3 As mentioned previously, to meet the confidentiality requirements, the organisation will be called The Company.

operational strategic business units (SBUs) servicing external clients and three Expert Departments⁴ servicing the SBUs with specialist knowledge.

The study was aimed at discovering the advisory engagements present among the employees within each of the Expert Departments and the advisory specialist support the Expert Department employees provide to the SBUs. In addition, key positional roles that Expert Department employees occupy in the networks would be used to ignite the introduction of knowledge sharing initiatives in The Company.

Against the above rationale, the choice of research methodology selected is stated in the next section.

4.3 Research methodology

The choice of research methodology employed is directly informed by the rationale of the study. One might consider mapping the informal relationships of a network by utilising a technique known as SNA. SNA is a diagnostic management tool, emanating from social network theory and analysis principles. SNA provides a means of visualising the X-ray patterns of relationships among individuals, teams, departments and even the entire organisation. It also measures the relationships and flows between people, groups or interacting functional units. Fundamentally, SNA is used to effectively map and measure networks, knowledge flows and relationships in organisations (Cross *et al*, 2001:100; Gretzel, 2001; O'Malley & Marsden, 2008:222; Krebs, 2010).

The next section in this chapter, examines the research problem first before proceeding into the section on the research design.

The following problem was formulated:

4 For confidentiality purposes, the names of the Expert Departments have been altered and alternative names have been created. None of these name changes has affected the essence of the study.

How can SNA be used to discover the corporate advisory networks of employees to enhance information and knowledge sharing?

In order to successfully address the research problem as stipulated above, the following sub-problems were identified:

- What is SNA and how can the SNA output be used to ignite knowledge sharing initiatives?
- What type of knowledge sharing initiatives can be applied practically in corporate environments?
- What does the SNA methodology entail in a corporate environment?
- How does SNA facilitate knowledge sharing through the discovery of corporate advisory networks?

In order to reach answers to the above stated questions, a specific research design approach was followed aimed at providing a solution to the research problem.

4.4 Research design

Mouton (2001:55) defines the concept 'research design' as a "plan or blueprint of how you intend conducting the research". According to Saunders, Lewis and Thornhill (2009:136) research design is the "general plan of how you will go about answering your research question(s)". Typically a researcher should begin by asking: What is research, why is the research necessary, and what strategy would best suit the study specifically? It is also crucial to understand the main ethical issues implied by the choice of research strategy (Saunders *et al*, 2009:160). First, the concept 'research' is defined.

4.4.1 Research defined within the scope of sociological assumptions

The concept 'research' is defined by the Oxford online dictionary (2013) as –

The systematic investigation into – and study of – materials and sources in order to establish facts and reach new conclusions.

Moreover Taylor (2002:2) notes that the fundamentals of research are to resolve problems and develop an awareness of the universe that is cautiously and methodically conducted. Research thus incorporates the systematic way of resolving problems to understand our universe and in this process establish facts and new inclusions.

Bhattacharjee (2012), guided by the seminal book; "Sociological paradigms and organizational analysis" by Burrell and Morgan in 1979, suggests that the study of social phenomena is shaped by two fundamental sets of philosophical assumptions: ontology and epistemology. Ontology refers to assumptions about how one sees the world, for example, does the world consist mostly of social order or constant change?, whilst epistemology refers to assumptions about the best way to study the world, for example, should one use an objective or subjective approach to study social reality?

If the world is viewed as consisting mostly of the ontology of social order, says Bhattacharjee (2012), then one seeks to study patterns of ordered events or behaviours. The best way to study such a world is by using the objective epistemology approach that is independent of the person conducting the observation or interpretation, such as by using standardised data collection tools, for example, surveys. The paradigm (that is, the mental models, frames or belief systems) followed that uses the objective approach is called the paradigm of functionalism.

The research study under investigation utilises the ontology of social order in an objective epistemology approach under the paradigm of functionalism to understand the patterns of advisory networks present in The Company under investigation.

In the next section of this chapter, the different types of research are examined to determine what type of research will be used for the research study.

4.4.2 Types of research

Saunders *et al* (2009:139) explain that, depending on the purpose of research, research projects can be grouped into three types: exploratory, descriptive, and explanatory. Exploratory research is often conducted in new areas of inquiry, where the goal of the research is to scope out the magnitude or extent of a particular phenomenon, problem, or behaviour. For instance, if the citizens of a country are generally dissatisfied with governmental policies during an economic recession, exploratory research may be directed at measuring the extent of citizens' dissatisfaction (Bhattacharjee, 2012).

Descriptive research, says Bhattacharjee (2012), examines the what, where, and when of a phenomenon. It is directed at making careful observations and detailed documentation of a phenomenon of interest. These observations must be based on the scientific method (that is, it must be replicable and precise), and therefore, are more reliable than casual observations. An example of a descriptive research is the tabulation of employment statistics from censuses by a country's bureau of labour, which may use these instruments for estimating employment numbers by sector.

Explanatory research, according to Saunders *et al* (2009:140), seeks explanations of observed phenomena, problems, or behaviours and answers questions as to the why and how types of questions. It attempts to "connect the dots" in research, by establishing "causal relationships between variables" and identifying causal factors and outcomes of the target phenomenon (Saunders *et al* (2009:140). Examples of

explanatory research include understanding the reasons behind adolescent crime or gang violence (Bhattacharjee, 2012).

Against this section's background, the research study under investigation will utilise a mix of exploratory, descriptive and explanatory types of research. This mix of research types are not unusual, says Saunders *et al* (2009:140), stating –

In the same way as your research question can be both descriptive and explanatory, so your research project may have more than one purpose.

The purpose of the empirical study is to ascertain through measurements the extent of the connectivity levels of the advisory networks in The Company and explain how the employees who occupy key positions (for example, the central connector) in the informal advisory structures impact the flow of information in these networks. This is done in line with the research aim stated in Section 1.5.1.4, namely to investigate SNA methodology and its practical application in the corporate world.

The next section describes key notations used in the SNA research methodology.

4.4.3 Social network analysis notations

SNA notations are important because they provide the measures with which observations can be measured and analysed.

4.4.3.1 *Graphs: Nodes and ties*

As stated in previous chapters, a social network is a structure of a set of actors, some of whose members are connected by a set of relations. These two elements, namely actors and relations, commonly define networks as a social structure wherein a set of nodes and sets of ties depict their network interconnections (Knoke & Yang, 2008:8).

Nodes (or actors) may be individual natural persons or collectivities such as functional SBUs or informal groups in the formal organisation (Knoke & Yang, 2008:6).

A relation is a specific connection or tie between a pair of actors, known as a dyad. Relations may be either asymmetric, directed where one actor initiates and the second actor receives (for example, advice-seeking relation) or in a symmetric non-directed tie (also known as undirected) where mutuality occurs in the case of where actor [A] converses with actor [B] (Knoke & Yang, 2008:6). The visual representations for directed and non-directed relations are illustrated below in Figure 4.1.

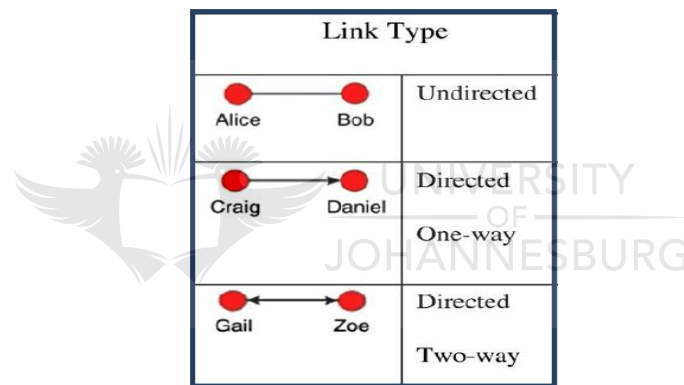


Figure 4.1: Link types
(Adapted from Hoppe & Reinelt, 2010:603)

In Figure 4.1, the undirected tie refers to how Alice and Bob converse. No arrowheads are shown as there is mutual engagement. In the directed one-way tie, Craig solicits advice from Daniel but Daniel does not. The tie is represented as a line with an arrow head directed at Daniel. In the directed two-way connection, Gail seeks advice from Zoe and Zoe seeks advice from Gail. The tie connection is represented as a line segment with arrow heads on either side of the line segment.

Another feature to consider on ties is tie strength. The frequency of interaction is defined as how often people contact each other for various reasons. Higher frequency engagements infer stronger ties. Visually, one may vary the thickness of lines between nodes to show the strength of a tie (Knoke & Yang, 2008:46).

In addition to the tie characteristics mentioned above, a different type of relation may be identified with different types of networks even where the observation is restricted to the same set of actors. As an example, a friendship network among office employees, very likely differs from their advice seeking network (Knoke & Yang, 2008:8). The next section under SNA notations, discusses graph structures.

4.4.3.2 Graph structures

Networks are represented as a graphic display consisting of points (also known as nodes or vertices) to represent actors and lines (also known as edge or arc) to represent the tie, that is, the relation (Knoke & Yang, 2008:45-46).

Sociologists borrowed this way of graphing networks from mathematicians, and re-named their graphics as sociograms, also called sociographs. The nodes often can be labelled by identifying names, letters or numbers next to the nodes. A line between a pair of nodes indicates a relation. The absence of a line means no direct relation exists between two actors (Hanneman & Riddle, 2005).

A network is 'connected' if every pair of nodes in the network is connected but is 'disconnected' if at least one pair of nodes has no tie between them (Knoke & Yang, 2008:48). In Figure 4.2, the two nodes are disconnected. Unconnected nodes in networks are known as isolates (Hanneman & Riddle, 2005, Knoke & Yang, 2008:48). As discussed previously in Chapter 2, isolates represent peripheral actors in the network such as new hires or specialists who have not integrated into the network.



Figure 4.2: Isolates
(Adapted from Hanneman & Riddle, 2005)

To re-iterate, a dyad is a connection between two actors. A triad (a triangle) consists of three actors, and these actors are connected to each other either through directed or undirected ties. The triad has long been considered the building blocks of informal networks (Kilduff & Tsai, 2003:11). A clique consists of actors who all interact with each other but have no common links to anyone else. The basic assumption is that all cliques are sub-sets from the main sociogram in which each node is in direct and reciprocal relation with all others (Scott, 2000:115). Cliques could be separated from the main network through what is known as 'cutpoints'. A cutpoint is a node that if removed disconnects the sociogram into sub-sociograms (Knoke & Yang, 2008:49). Figure 4.3 below, shows a clique of varying sizes.

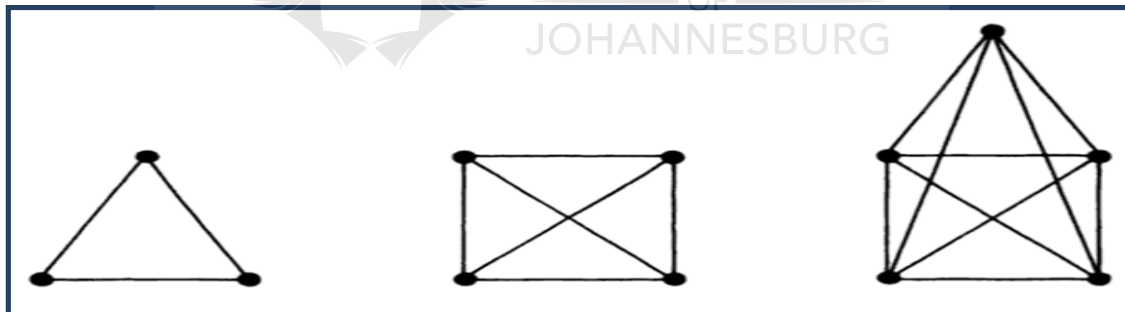
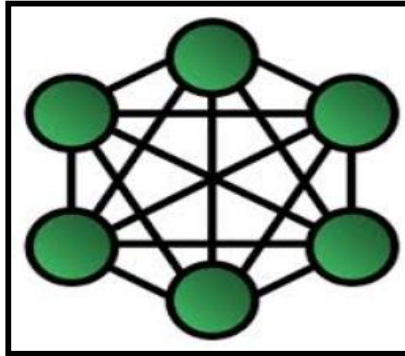


Figure 4.3: Cliques
(Adapted from Scott, 2000:115)

A network in which all actors are equally connected to everyone else is known as a mesh, also called a heterarchy. This structure is common in close knit team organisations. Figure 4.4 below illustrates a mesh structure.



*Figure 4.4: Mesh
(Adapted from Anklam, 2007:54)*

A network may also take the form of the hub-and-spoke structure which reflects the star pattern (Anklam, 2007:54). In Figure 4.5 below, actor [A] has a highly favoured structural position in the star network because it has more opportunities and alternatives than other actors. If actor [F] elects to not exchange information with [A], [A] has a number of other actors to consult with and get information. However, if [F] elects to not exchange with [A], then [F] will not be able to exchange at all.

Moreover, the more ties an actor has then, the more power they have. In the star network, actor [A] has a tie (degree) of six, while all other actors have a degree one or a tie of one. The more ties also imply more opportunities to resource information exchange because they have more choices. This autonomy makes 'central actors' such as actor [A] less dependent on any specific actor, and hence more powerful in the organisation.

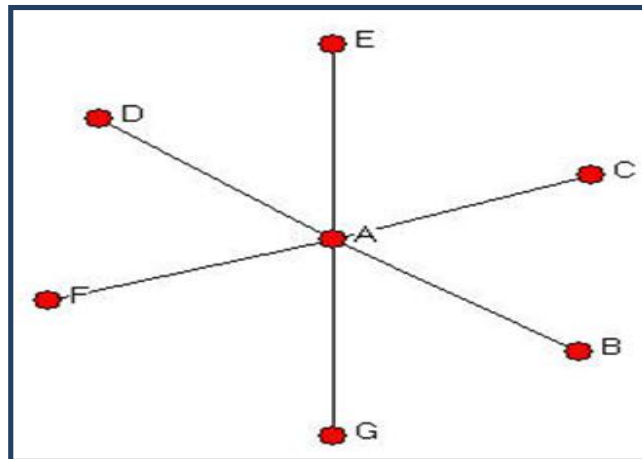


Figure 4.5: Star
(Adapted from Hanneman & Riddle, 2005)

In the empirical research component of the study, both the mesh and star structures are envisaged as possible output structures for the advisory networks.

4.4.3.3 Relational measurements in matrices

Network relations of a graph (sociogram or sociograph) can be expressed quantitatively and analysed mathematically using matrices. The social network data collected from, for example, a survey can be displayed in a table called a sociomatrix, which is typically a square array of numerical elements arranged in rows and columns. The score (derived from the survey data) about the ties between each pair of actors of a network is recorded in each cell of the sociomatrix table. The simplest and most common matrix is binary, which means that if a tie is present between a pair of nodes, a number one is entered in the cell, and if there is no tie, a zero is entered in the cell. This kind of matrix is called an adjacency matrix because it represents who is next to whom in the sociogram (Hanneman & Riddle, 2005; Knoke & Yang, 2008:49).

Hereunder in Figure 4.6, is an example of an adjacency sociomatrix represented by directed ties. There are five rows, five columns and four actors in the network. Bob

selects Carol to ask for advice on work matters, but Carol does not choose Bob. On the other hand Carol chooses Ted and Ted chooses Carol. In the Bob–Carol relationship, a directed one-way relationship exists, while in the Ted–Carol relationship, a directed two way relationship is present. The matrix as such represents the rows as the source of directed ties, while the columns are the targets (Hanneman & Riddle, 2005).

	Bob	Carol	Ted	Alice
Bob	---	1	1	0
Carol	0	---	1	0
Ted	1	1	---	1
Alice	0	0	1	---

*Figure 4.6: Directed binary sociomatrix
(Adapted from Hanneman & Riddle, 2005)*

Using the directed binary sociomatrix, a number of measurements can be made to inform the researcher of the relational measurements of the networks under investigation. Some of the measures worth considering are described hereunder.

The term 'cohesion' indicates the presence of strong socialising relationships among network actors, and the likelihood of their having access to the same advice and information. General measures of cohesion include density, centrality and distance measures which indicate the extent to which all actors of a network interact with all other actors in the same network (Haythornthwaite, 1996:332).

In order to create a clear sense of the current study's research design, more detail on the measures of cohesion follow:

- **Density** is a measure of the level of connectivity within a network group to determine, for example, the level of connectivity for the advisory communication flow through the group. Density is calculated as the total

number of relational ties in the group divided by the total possible number of ties (Hatala, 2006:52). The software Ucinet 6 for Windows Version 6.289 can mathematically compute density measurements for a given set of observations such as survey data (Borgatti, Everett & Freeman, 2002). The density value produces a measure that has a range from 0 to 1, where 1 represents all actors are connected to all other actors in the group, that is, 100% connectivity. Low density levels may indicate poor connectivity, whilst a high number may show a close-knit group. Determining the appropriate density for any group requires an assessment of the function of the group and its need to be either tightly or loosely connected (Hatala, 2006:56).

- **Centrality** is measured by counting the number of relationships maintained by each actor in a network. In a sociograph this can be done by counting the number of ties (lines), going into or out of a particular node (actor). Each count is measured as a degree number value. For instance an actor with five incoming ties has an in-degree value of 5, and if there are three outgoing ties, then the out-degree is a value of 3 (Hanneman & Riddle, 2005). An actor with the most lines, that is, the highest degree, is the most central in the network. This position gives the actor a great deal of access to information resources from others in the network. The position also provides an actor with the possibility of forwarding information or providing consultative advisory support to others in the network. The actor has therefore, a prominent position of power and influence over others (Haythornthwaite, 1996:334).
- **Distance** is a measure of how many actors a piece of information needs to go through to get to everyone in the network. This is the 'degrees of separation' concept that was mentioned in Chapter 2. The distance measure is important because it reflects a network's agility in responding to external conditions. In other words, it can indicate how quickly, for example, information can spread out across a network to reach all actors in the network (Anklam, 2007:76). One particular definition of distance is called 'geodesic distance' in directed

graphs. Geodesic distance between a pair of actors is the length of the shortest path between the two actors. Hence, the geodesic path (or paths, as there could be more than one path) taken is the most efficient connection between two actors (Wasserman & Faust, 1994:134). Using Ucinet 6 for Windows Version 6.289 software, one can easily locate the length of the geodesic paths in a directed binary sociomatrix of advisory actor exchanges (Borgatti *et al*, 2002).

For the purpose of the research study, the survey data collected from the advisory relationships will be tabulated into sociomatrices and the relational ties will be measured against the criteria of density, centrality and geodesic distance to further elucidate the characteristics of the networks.

In the next section, the steps taken to conduct the SNA methodology are outlined.

4.4.4 SNA methodology

Grounded by the literature review of social network theory and SNA principles discussed in Chapter 2 together with the research problem and sub-problems stated earlier on in this chapter and the description given on the SNA notational concepts, the research design for this study employs the SNA research methodology. SNA is regarded as the most suitable method to discover the effectiveness of the Expert Departments employees' advisory engagements within and across The Company.

4.4.4.1 Data collection

There are three approaches to research as far as data collection is concerned, namely, quantitative research, qualitative research, and mixed methods research (Creswell, 2003:18). The first approach is where the researcher collects data from empirical observation using instruments such as surveys that can yield statistical

data. Surveys involve the use of standardised questionnaires or interviews to collect data about people and their preferences, thoughts, and behaviours.

The second approach is qualitative research where for example narratives are collected with the primary intent of developing themes from this data (Cresswell 2003:18). The third and final approach is called mixed methods research, which involves the collection of both numeric data as well as text data to better understand the research problem (Creswell, 2003:20).

In order to perform this research study, the SNA methodology employed empirical quantitative research, using primary relational numerical data collected from a survey. Heeding the advice of Mouton (2001:144,152), the researcher developed a questionnaire as the data collection instrument which gave the research participants clear guidelines pertaining to what is required in terms of their participation (*cf* Annexure A, B and C).

Wasserman and Faust (1994:43), in respect to SNA methodology, explain the concept of 'unit of analysis' and 'observation set' which, for this study, are the actors (namely, the employees from the Expert Departments) and their relations with other actors (namely, the other employees in their Expert Departments or with SBUs) in the observation set (namely, The Company).

4.4.4.2 Sampling

To identify and define the target population, this research study adopted the full network and ego-centric methods of sampling (Hanneman & Riddle, 2005; Hatala, 2006:51). According to Hanneman and Riddle (2005) and Hatala (2006:51), in the full network sample, all data within a natural occurring cluster (or boundary) such as a classroom, organisation, club and neighbourhood is utilised. Selecting all data as units of observation implies a census type of sampling. The advantages of this approach are twofold:

- It is free from sampling errors
- The full network picture of the social structure is attained

Unfortunately, though, this approach can become very expensive and difficult to collect. Obtaining data for every employee in a large organisation, and having every employee rank the level of interaction with every other member can be a very challenging task. Nevertheless, full network analysis is possible when the sample group is small (Hanneman & Riddle, 2005).

For large sample populations, the ego-centric method (ego-only) can be used. In this instance, the individual (also known as the 'ego') is asked to identify a limited number of specific individuals or groups with whom the person has ties. The analysis of such an ego network means that albeit the full network picture is not attained, the individual's relationships and positional prominence in the organisation will be surfaced (Hanneman & Riddle, 2005).

In this study, both the ego-centric sampling and census (full network data collection) sampling techniques were used. Census sampling is used to measure the inter-relationships among employees in each Expert Department, while ego-centric sampling is used to measure the extent Expert Department employees provide advisory support to the SBUs.

To execute the sampling technique, the survey was designed into a structured questionnaire. The study focused on two main questions and elicited from each Expert Department employee the responses to:

- **Question 1:** Which individual(s) from inside their own Expert Department do they approach for advice on work related matters? The employee from each Expert Department selected and ticked off the applicable name(s) from a predefined list of names (roster) and assigned a frequency number (the degree of interaction) next to each ticked name. The roster names

were obtained from The Company's Human Resources Department. This question covers census type of sampling.

- **Question 2:** Which SBU(s) (outside of their own Expert Department) approach them for advice on work related matters? The employee from each Expert Department again selected and ticked off from a predefined list of SBU(s) and assigned a frequency number next to each selection. Again, the predefined list of SBU names was obtained from The Company's HR department. This question covers the ego-centric method type of sampling.

Both questions refer to a roster of names. The basis for the use of a roster was done in accordance to the example of Wasserman and Faust (1994:46); using a roster was selected because it was simpler for employees to remember with whom the employees have a specific tie than having to recall the name of a staff member or SBU. Annexure A-C illustrate the surveys administered to each Expert Department (pseudo-names are used both in explaining the SNA methodology and in reporting the findings of the empirical study).

The administration of survey submission occurred via the Expert Departmental meetings that were held on a weekly basis in The Company. The researcher administered the survey in paper format to each employee at the meeting. Before the participants (employees) completed the survey, they were informed of the purpose of the research study, ethical concerns discussed in Section 4.4.4.4 below, and of the non-negotiable mandatory requirement that everyone had to complete the survey in order to make this research viable. The surveys were filled-in at the meeting and returned to the researcher. If some employees were absent from this meeting, the researcher would follow-up either telephonically and/or by email and meet with them face-to-face to ensure the survey was completed.

4.4.4.3 Measurement and analyses of relations

After all the surveys were collected from the Expert Departments, the raw data was entered into Ucinet 6 for Windows version 6.289 software (Borgatti *et al*, 2002), and processed to generate dichotomised sociomatrices for each Expert Department. Dichotomisation refers to the process of converting the raw survey data into binary form of ones and zeros. For example, the presence of a tie between two actors would produce a value of one, whilst the absence of a tie would produce a value of zero (Hanneman & Riddle, 2005).

From the sociomatrices, the density, centrality, geodesic distances and number of cliques were measured for the internal relationships among employees in each of the Expert Departments.

In addition, the sociomatrices were used to visualise the sociograms (that is, network graphs). Netdraw software version 2.097 which is distributed along with the Ucinet software was used to generate sociograms for the relationships among the team members in each of the Expert Departments and sociograms were also produced for the consultative advice the Expert Department employees provide the SBUs. To gain further clarity on the interpretation of the sociograms, the researcher used Microsoft Windows Excel 2010 to generate bar charts.

From the results generated, deductive, inductive generalisations and retroductive reasoning was employed to draw conclusions on the findings of this analysis (Mouton, 2001:117-118). In accordance to SNA methodology, feedback together with recommendations were given to the executive leadership of The Company regarding the characteristics of the informal structures present and listed the key individuals occupying strategic positions in the network who could possibly initiate knowledge sharing initiatives in The Company. Giving feedback is a crucial component of SNA methodology, as is ethic.

4.4.4.4 Ethical considerations

In this study the researcher informed executive leadership and employees from the Expert Departments of The Company about the ethical concerns before conducting the investigation. The researcher pointed out to the executives, the key areas of concern when the results of network analysis are used to make severe organisational and personnel changes, such as in laying off employees or disbanding a whole department because they fared seemingly 'badly' in the network results. In light of such concerns, employees may answer the survey dishonestly, thereby introducing threats to the validity of the research study (Borgatti & Molina, 2005:108).

Another aspect to consider in network analysis is that respondents (that is, employees) need to include their names on network surveys and therefore the lack of anonymity at the questionnaire level, coupled with the sensitivity of some of the questions, posed the risk that employees may not wish to respond to the survey (Borgatti & Molina, 2005:109).

Grounded by these concerns, the researcher provided guidelines to executive leadership to adhere to and protect all parties concerned. Although the guidelines could take the form of a management disclosure contract or consent form between the researcher and executive leadership as advised by Borgatti and Molina (2005:109), the researcher of this study did not formalise it as such. Instead, the guidelines served to state what data would be seen by executive leadership and how the network data and analysis would be used by executive leadership of The Company, thereby adhering to the following guidelines set by Borgatti and Molina (2005:114):

- *Rights of the researcher in terms of study authorisation*

The data is properly anonymised so that neither employees nor The Company are identified. The output of the research study will form the basis for scholarly publication.

- *Rights of the company*

The researcher will furnish The Company with a copy of the data. The Company agrees that the data will not be shared among employees and will only be seen by top management. Moreover, the company agrees that the data will not form the basis from which departments or individuals will be evaluated, but will be used in a development way to improve the functioning of The Company.

- *Rights of the respondents*

The participants (that is, employees) of the survey whose networks are being measured may request a general report from the researcher or The Company that does not violate confidentiality of themselves or other participants regarding what was learned in the study.

4.4.4.5 Validity and reliability

Validity in SNA research means that a relational measure is valid to the extent that it actually measures what it intended to measure (Wasserman & Faust, 1994:57). By way of an example, if a researcher asked an employee (in other words, the respondent) in a survey "which colleagues they turn to for advice?" the response received has a validity measure because it gives the answer of the set of colleagues whom the employee sought out advice from.

However, if the respondent answers the survey in a self-serving unethical manner, then the validity of the responses received will be inaccurate and questionable. As an example, if in ego-centric sampling, the ego overrates the number of individuals or groups with whom the ego has ties with, then the ego's position would be shown as overly prominent in the network structure and thereby render the structure as invalid. To overcome the invalidity issue, the researcher could validate some of ego's selected actors with whom ego has ties by asking those selected actors if the relationship does indeed exist (Borgatti & Molina, 2005:108).

Reliability is described as "the ability of the measurement instrument" by Kogovsek, Ferligoj, Coenders and Saris (2002:2); that is, the survey needs to produce the same results in a repeated measurement. Reliability in sociometric data can be assessed in two ways. One way is in the choice of actors made by the survey respondent, and this selection should not change over short periods of time. However, over long periods social phenomena cannot be assumed to remain in stasis because the actors chosen by the respondent may no longer have ties with the respondent. For instance, employees chosen by the survey respondent may have left the organisation resulting in the possibility of a broken work advisory relationship (Wasserman & Faust, 1994:58).

The second way of evaluating reliability is in the survey respondents' aggregated measures for a chosen actor. For example, the popularity of an actor could be measured over the total number of times it was elected as a connection by other respondents (Wasserman & Faust, 1994:58).

4.5 Summary



The objective of the research is to investigate SNA methodology and its practical application in the corporate world. This chapter sums up the research design and SNA methodology followed to respond to the research problem stated in Chapter 1 and restated in the introduction of this chapter. Given the research objective, the research design utilises a mix of exploratory, descriptive and explanatory types of research.

The design is determined by the purpose of the research, namely, to ascertain through measurements the extent of the connectivity levels of the advisory networks in The Company and explain how the employees who occupy key positions in the informal advisory structures impact the flow of information in these networks.

For the purpose of the research study, the survey data collected from the advisory relationships will be tabulated into sociomatrices and the relational ties will be measured against the criteria of density, centrality and geodesic distance to further elucidate the characteristics of the networks. Chapter 4, therefore effectively responds to the third sub-problem, namely-

What does the SNA methodology entail in a corporate environment?

The results and findings on the effectiveness of Expert Departments employees' advisory interactions within their own departments and across to the SBUs will be presented in sociograms, Microsoft Excel charts and in the metrics of the sociomatrices in the next chapter.



Chapter 5

Results and interpretations

5.1 Introduction

In the previous chapter, the research design and social network analysis (SNA) methodology were explored in detail. A description was also given on the background of the empirical study and the proposed approach on how this study was to be carried out.

In this chapter, the results and interpretation of the findings of the empirical study will be examined.

5.2 Survey collection

Employees from each of the three Expert Departments responded to the same two questions posed in the survey as reflected in Annexure A-C (*cf* Sampling discussed in Section 4.4.4.2).

Table 5.1 below shows a breakdown of the number of respondents who completed the survey per department. Twenty-two individuals completed the survey with a response rate of 100% (as mentioned, participation was compulsory). As noted previously in Chapter 4, to protect The Company and its employees, the names of individuals as well as SBU names have been altered and given pseudo-names for this study. This approach has not impacted the analysis and interpretation of the research but effectively protects The Company's concerns on confidentiality issues.

Table 5.1: Survey responses per Expert Department

Expert Department Name	Annexure	Number of employees (ie, respondents) who completed the survey	Percent Completed
EVA	A	9	100%
WOR	B	10	100%
ENV	C	3	100%

As illustrated in the annexure of this dissertation, Question 1 solicited the response from each employee of the Expert Departments to select which individual(s) from inside their own Expert Department do they approach for advice on work related matters? The respondent from each Expert Department selected and ticked off the applicable name(s) from a predefined list of names (the roster) and assigned a frequency number (the degree of interaction) next to each ticked name using the Likert-type of scale. Question 1 covered the census type of sampling as discussed in Chapter 4.

Question 2 on the other hand solicited a response from each employee from the Expert Departments to select which strategic business unit or units (SBUs) outside of their own Expert Department approach them for advice on work related matters? The employee from each Expert Department once again selected and ticked off from a predefined list of SBU names and assigned a frequency number next to each selection. This question covers the ego-centric method (ego-only) type of sampling. In this case, the frequency number assigned was not based on the Likert-scale because the researcher's objective was to determine the total number of SBU engagements that each Expert Department collectively has. This type of frequency selection is called "free choice" (Wasserman & Faust, 1994:47) and allows respondents to select the number of interactions and not to restrict them to a fixed number as is the case in the Likert-scale rating.

Based on the responses received in the above two questions, the research study would surface the current engagement issues associated with:

- How employees within the Expert Departments interact with one another in the departmental network
- The extent departmental employees are soliciting, advising and learning from each other
- The identification of individuals whom are more prominent key players and those who are either peripheral or brokering positions in the Expert Department networks
- The identification of individuals who are being solicited the most for advice on work issues
- The identification of employees from the Expert Departments engaging with, and providing consultative support to the SBUs within The Company
- The identification of employees who most prominently provide this type of consultative support to the SBUs
- The identification of which SBUs are receiving this support from each respective Expert Department

By doing this, the results therefore will show the internal advisory Expert Departmental connections and the external consultative support SBUs receive from the Expert Departments employees. Moreover, the main research question stated in Chapter 1, namely: "How can SNA be used to discover the corporate advisory networks of employees to enhance information and knowledge sharing?" are addressed and answered in this chapter.

5.3 Analysis and measurement

Once the survey data was collected, the relationship ties were tabulated into the sociomatrix tables for each Expert Department. The tables were then imported into the Ucinet 6 for Windows Version 6.289 software (Borgatti *et al*, 2002) and dichotomised into binary sociomatrices. The matrices were used to measure the relations among the members (employees) of each Expert Department, for directed relations. The relations were measured and calculated for density, centrality, and

geodesic distance metrics and for the number of cliques identified per Expert Department. The binary matrices were also used to draw out the sociograms using Ucinet's Netdraw software, version 2.097, for the internal departmental connections and for the SBU advisory engagements with Expert Department employees. In addition, since the SBU relationships are undirected ties with the Expert Department employees, no Ucinet metrics was calculated for this set of data.

5.4 Results and interpretation of results

The results and interpretation of results for each Expert Department are discussed in this section. Specific attention is given to each department's internal advisory engagements and external advisory engagements.

5.4.1 Expert Department–EVA (internal advisory engagements)

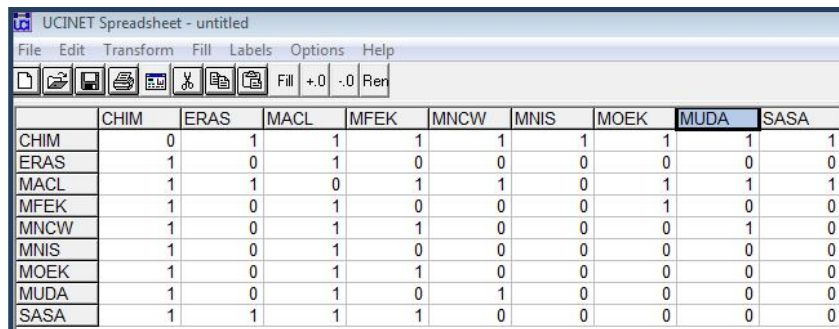
Table 5.2 below illustrates the consolidated input from the survey data for the internal relations for Expert Department–EVA. The numbers in the table show that the frequencies of the connections are predominantly monthly, weekly or daily (that is, response scale of two and higher).

Table 5.2: Expert Department–EVA's internal advisory relations

	CHIM	ERAS	MACL	MFEK	MNCW	MNIS	MOEK	MUDA	SASA
CHIM		3	4	1	1	1	1	1	4
ERAS	3		3						
MACL	4	4		4	3		3	4	3
MFEK	1		3				4		
MNCW	1		4	2				4	
MNIS	1		4						
MOEK	1		4	3					
MUDA	1		3		4				
SASA	4	2	3	3					

The table below shows the dichotomised binary data for Expert Department–EVA. Zero in the cells show absence of a connection, whilst a number one indicates the presence of a relation.

Table 5.3: Expert Department–EVA's internal binary advisory relations



	CHIM	ERAS	MACL	MFEK	MNCW	MNIS	MOEK	MUDA	SASA
CHIM	0	1	1	1	1	1	1	1	1
ERAS	1	0	1	0	0	0	0	0	0
MACL	1	1	0	1	1	0	1	1	1
MFEK	1	0	1	0	0	0	1	0	0
MNCW	1	0	1	1	0	0	0	1	0
MNIS	1	0	1	0	0	0	0	0	0
MOEK	1	0	1	1	0	0	0	0	0
MUDA	1	0	1	0	1	0	0	0	0
SASA	1	1	1	1	0	0	0	0	0

The centrality measure, in other words, the number of incoming and outgoing degrees (ties) for each employee for EVA's internal relations is shown below in Table 5.4. The top two individuals with the most incoming and outgoing ties, are Chim, who has a total of 16 ties, followed by Macl with 15 ties, whilst the rest of the departmental members have half or less ties with each other. Chim and Macl exhibit characteristics of holding the position of central connector in the network as was discussed in Chapter 3. The central connector role exhibits qualities of prominence, prestige and influence (Hanneman & Riddle, 2005). The high in-degree values mean many employees connect to Chim and Macl to seek advice because they trust their expertise, making these two actors prominent in the internal advisory network, whilst a high out-degree suggests that Chim and Macl make others aware of their expertise thereby influencing others with their advisory 'deep smarts' expertise and points of view (Hanneman & Riddle, 2005; Parise *et al*, 2006:33).

Table 5.4: Expert Department–EVA's internal in-out centrality relations

	OutDegree	InDegree
CHIM	8.000	8.000
MACL	7.000	8.000
MNCW	4.000	3.000
SASA	4.000	2.000
MFEK	3.000	5.000
MUDA	3.000	3.000
MOEK	3.000	3.000
ERAS	2.000	3.000
MNIS	2.000	1.000

Table 5.5 below depicts the overall density of the network, that is, level of connectivity in the Expert Department–EVA's internal advisory relations which generated a value of 0.5, implies a 50% connectivity value within the network. This value is high and reflects strong connectivity in the advisory and learning relations within the Department.

Table 5.5: Expert Department–EVA's overall internal density

The screenshot shows a Notepad window titled 'OUTPUT.LOG1 - Notepad' with the following content:

```

DENSITY / AVERAGE MATRIX VALUE
-----
Input dataset:      Internal Departmental Connections (C:\Users\ev\is\Desktop\EVAL-INT\Internal Departmental Connections)
Output dataset:    Internal Departmental Connections-density (C:\Users\ev\is\Documents\UCINET data\Internal Departmental
Connections-density)

Density  No. of Ties
-----  -----
Internal Departmental Connections  0.5000  36.0000
    
```

Table 5.6 shows the calculated measured values for the Expert Department–EVA's geodesic distances for each pair of actors. The geodesic distance is the most efficient path taken for advisory knowledge to flow. What is interesting to note is that no more than two steps are required to ensure knowledge flows through the network. For example, Chim in row 1 is connected to Eras in column 2 (shown as 2E) by one step. Whilst Eras in row 2 is connected to Mfek in column 4 (shown as 4M) by two steps; Chim is the only person who is closest to everyone because Chim is only one step away from connecting to everyone else in the department.

Table 5.6: Expert Department–EVA's geodesic distances for internal advisory engagements

GEODESIC DISTANCE										

Geodesic Distances										
		1	2	3	4	5	6	7	8	9
		C	E	M	M	M	M	M	M	S
1	CHIM	0	1	1	1	1	1	1	1	1
2	ERAS	1	0	1	2	2	2	2	2	2
3	MACL	1	1	0	1	1	2	1	1	1
4	MFEK	1	2	1	0	2	2	1	2	2
5	MNCW	1	2	1	1	0	2	2	1	2
6	MNIS	1	2	1	2	2	0	2	2	2
7	MOEK	1	2	1	1	2	2	0	2	2
8	MUDA	1	2	1	2	1	2	2	0	2
9	SASA	1	1	1	1	2	2	2	2	0

Table 5.7 below portrays that there are four distinct cliques in the advisory network with a minimum size of three employees in each clique. What the cliques suggest is that if the network had to break-up, four cliques would operate independently from the main network. The employees would continue working and soliciting advice from one another in direct reciprocal engagements and the Expert Department–EVA would continue to function without major disruptions. What is notably unique in the clique structures, is that Chim and Macl are present in all four of them making them prominent actors.

Table 5.7: Expert Department–EVA's advisory cliques

```

OUTPUT.LOG15 - Notepad
File Edit Format View Help
-----
CLIQUES
-----
Minimum Set Size:           3

4 cliques found.

1:  CHIM MACL MFEK MOEK
2:  CHIM ERAS MACL
3:  CHIM MACL MNCW MUDA
4:  CHIM MACL SASA
    
```


Figure 5.1 on the next page portrays the internal advisory connections among the Expert Department–EVA's employees. As mentioned before in the metrics, Chim and Macl are the most central connectors with the highest in- and out-degrees. However, on closer inspection of the graph, Macl has more frequent interactions (weekly or daily or monthly), depicted by the thickness of the line intensity of the coloured lines, and thus has stronger ties with other members in the Department than Chim.

Although Chim may have the same number of associations as Macl, these ties are weak ties as he interacts with others only a few times a year as shown by the intensity of the weak coloured lines. Mfek, on the other hand may not have as many ties but has a strong (line intensity of the connections are strong in colour) blend of one-way and two-way advisory relationships with other colleagues, indicating that he is indeed sought after for his expertise.

If one had to omit the key players, Macl and Mfek, would the sociogram fragment completely? The answer is no. See Figure 5.2 on the next page. Chim keeps the network functional and intact as he is viewed as a broker as well as a central connector. There are no peripheral players in this network as everyone is embedded strongly in the network structure.

In terms of the structure of the network, this sociogram resembles that of the mesh structure (as described in Chapter 4), indicative of a close-knit department. The high connectivity nature of this structure is further affirmed by the strong density calculated value shown earlier on in Table 5.5 above. The graph thus validates the accuracy of the density calculation.

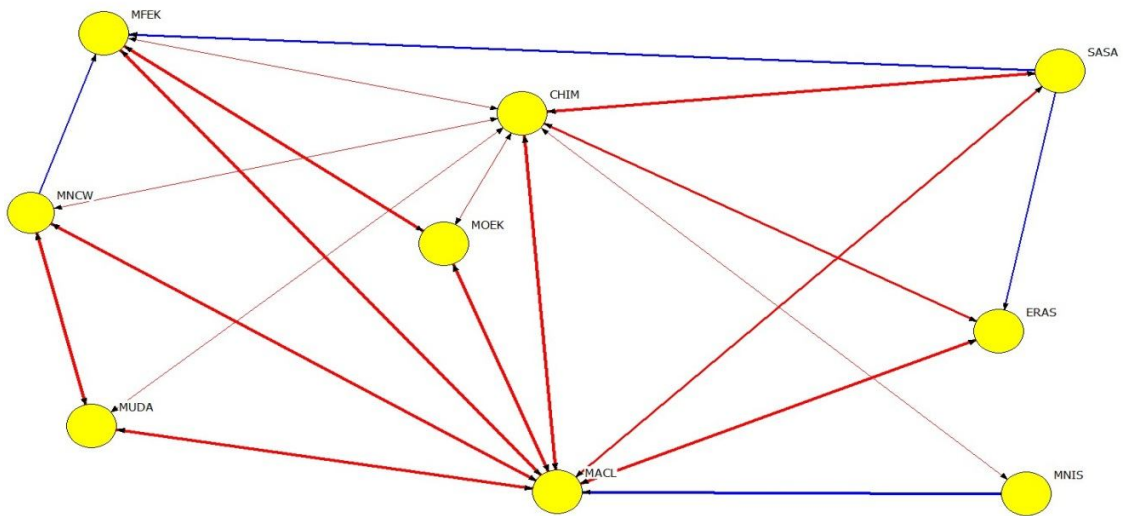


Figure 5.1: Expert Department-EVA sociogram



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Legend	
	Employee
	Directed bi-directional (two-way) connection
	Mono-directional (one-way) connection
Line intensity of connecting lines	Thick coloured lines represent frequent interactions (either daily, weekly or monthly). Thin coloured lines denote infrequent interactions (a few times a year)

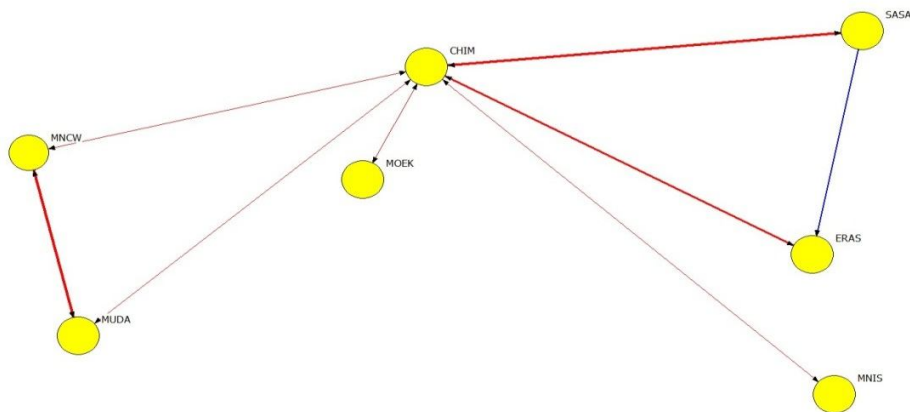


Figure 5.2: Expert Department-EVA sociogram, with Macl and Mfek removed

Grounded by the above results and interpretations, Macl, Mfek and Chim would probably serve as good knowledge sharing agents to start-up knowledge sharing initiatives, such as storytelling and after action reviews (AARs) and transfer their skills to less experienced staff members within their department.

5.4.2 Expert Department–EVA (external advisory engagements)

Figure 5.3 below depicts the consultative advisory support the Expert Department–EVA employees provide to the SBUs.

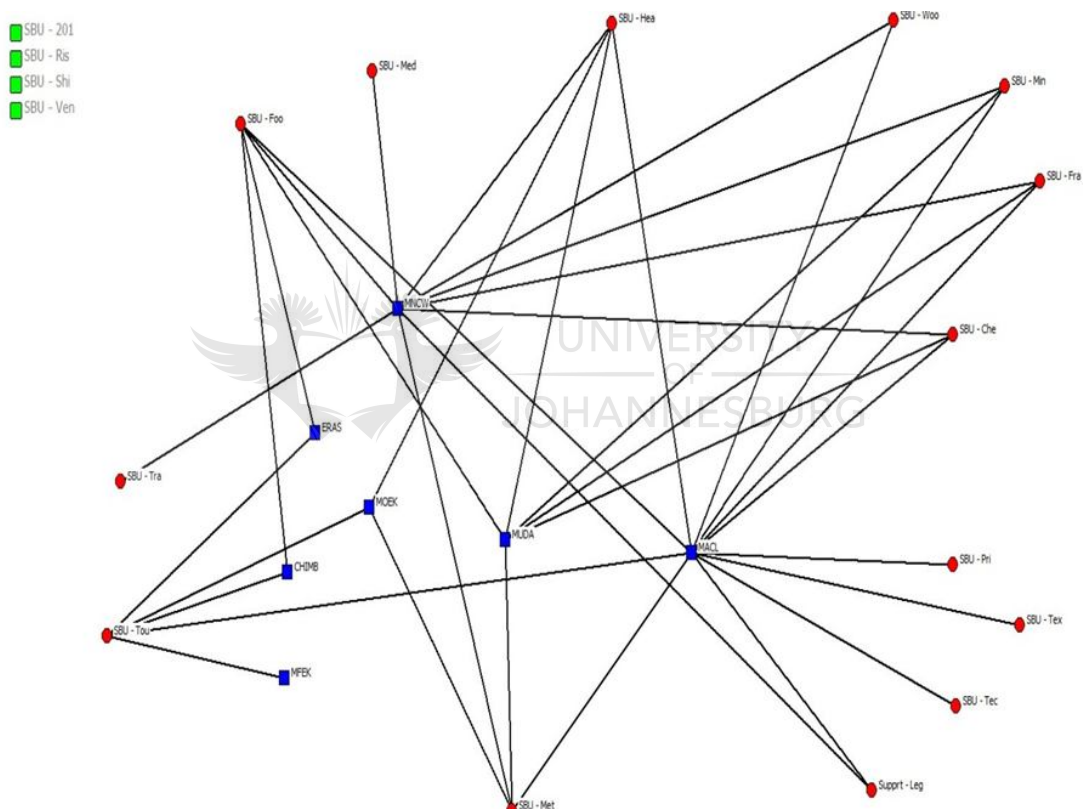


Figure 5.3: Expert Department–EVA sociogram engagement with SBUs

In Figure 5.3 above, the chart (sociogram) illustrates how SBUs (red circles) connect and solicit advice from the individual staff members of the EVA department (navy boxes). Some SBUs have multiple engagements with EVA employees. Macl and Mncw, specifically advise and support many SBUs, whilst Muda and some of the

other EVA employees interact with SBUs to a lesser extent. In actual fact, only seven out of the nine employees in EVA provide support to the SBUs. Employees, such as Sasa and Mnis do not provide any consultative support. In addition four SBUs (denoted as isolated green boxes) do not approach EVA employees, and therefore do not receive consultative support from this department.

It is evident that while Chim interacts prominently with the EVA employees, his external interactions with the rest of the SBUs are limited. Moreover, if five EVA employees are removed from the network in Figure 5.3, and only Macl and Mncw are retained in the network, would the advisory support to the SBUs collapse? The answer is no. See Figure 5.4, Macl and Mncw are able to maintain the network intact.

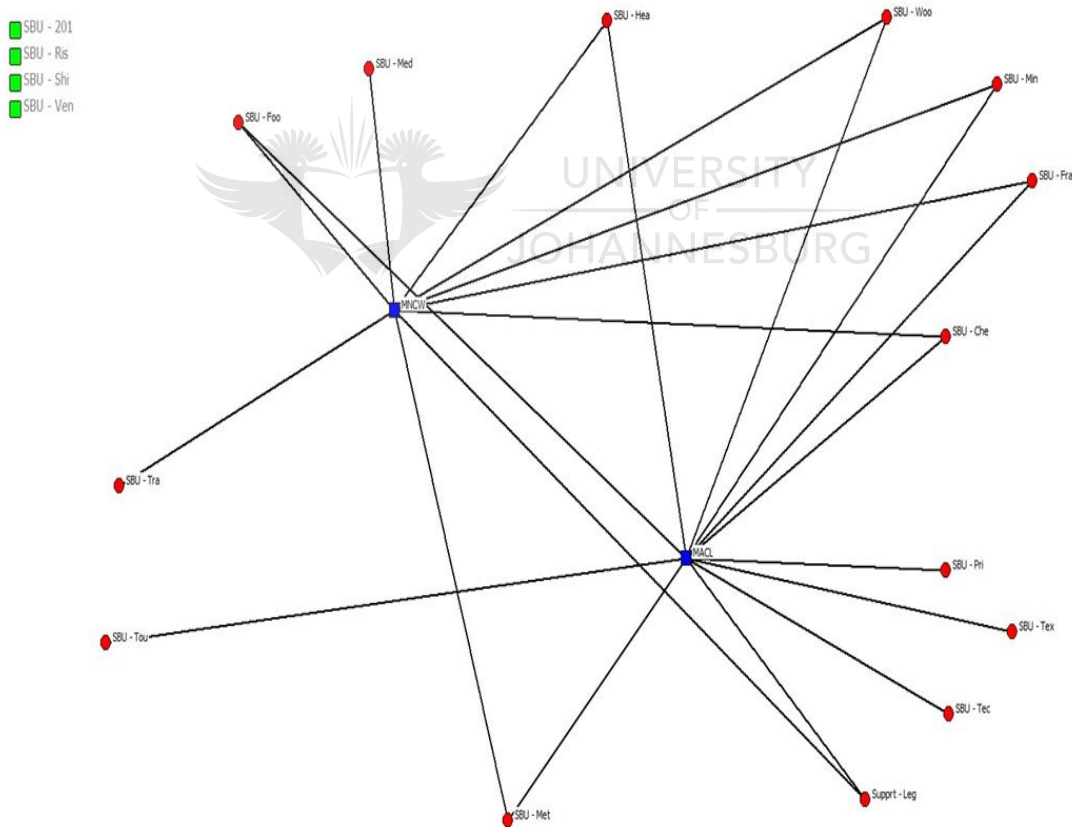


Figure 5.4: Expert Department–EVA sociogram engagement with SBUs, retain Macl and Mncw

Figure 5.4 can also be represented as a quantitative bar chart graph showing the cumulative advisory frequency engagements EVA's employees provide to each SBU. Figure 5.5, depicts this result.

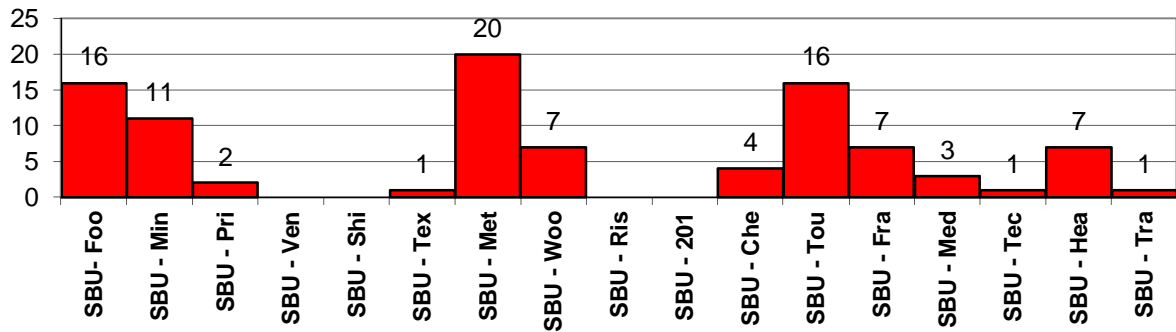


Figure 5.5: Expert Department–EVA's engagement with SBUs

In Figure 5.5, the top three SBUs having the highest number of engagements with the EVA Expert Department are: SBU Met, SBU Tou and SBU Foo.

Based on the results for external advisory support engagements, Macl and Mncw are potential good knowledge sharing agents to share their expertise through the establishment of Communities of Practice (CoPs). Another intervention is to provide advisory support to the isolated SBUs by motivating Sasa and Mnsi to engage with these SBUs.

5.4.3 Expert Department–WOR (internal advisory engagements)

Table 5.8 on the next page shows the consolidated input from survey data for Expert Department–WOR. The numbers in the table show the frequency of the connections are either monthly, weekly or daily (that is, response scale of 2 and higher). A response scale of less than 2 is not visible, which implies that the advisory connections among employees are frequent suggesting strong ties. In Chapter 2, Section 2.4 refers to the concept of 'strong ties' where employees form relations

because they tend to be 'homophilous', meaning that employees from the same department are similar in nature; they in turn develop trusted reciprocal strong relations and engage in advice seeking engagements to solve complex problems (Van der Hulst, 2009:107; Borgatti & Halgin, 2011:3).

Table 5.8: Expert Department–WOR's internal advisory relations

	DEBE	DOCR	GELD	MCGL	MPAK	MSIM	NKOS	NYAL	TUNY	ZWAN
DEBE		3	2		3	4		4		
DOCR		0				4		4		
GELD		2	0			4		4	2	
MCGL				0	3	4		4		
MPAK					0	4		4		
MSIM	4	4	3	4	4	0	4	4	4	4
NKOS						4	0	4		
NYAL	4	4	4	4	4	4	4	0	4	4
TUNY		3	2		3	4		4	0	
ZWAN					3	4		4		

The Table 5.9 below shows the dichotomised binary data for Expert Department–WOR; zero shows absence of a connection, whilst a number one indicates the presence of a relation.

Table 5.9: Expert Department–WOR's internal binary advisory relations

	DEBE	DOCR	GELD	MCGL	MPAK	MSIM	NKOS	NYAL	TUNY	ZWAN
DEBE	0	1	1	0	1	1	0	1	0	0
DOCR	0	0	0	0	0	1	0	1	0	0
GELD	0	1	0	0	0	1	0	1	1	0
MCGL	0	0	0	0	1	1	0	1	0	0
MPAK	0	0	0	0	0	1	0	1	0	0
MSIM	1	1	1	1	1	0	1	1	1	1
NKOS	0	0	0	0	0	1	0	1	0	0
NYAL	1	1	1	1	1	1	1	0	1	1
TUNY	0	1	1	0	1	1	0	1	0	0
ZWAN	0	0	0	0	1	1	0	1	0	0

The centrality measure, that is, the number of incoming and outgoing degrees (ties) for each employee for WOR's internal advisory relations is shown on the next page in Table 5.10. The top two individuals with the most incoming and outgoing ties, are Msim and Nyal whom each command a total of 18 ties. The rest of the WOR's

employees each have less than half of this number of ties with their departmental colleagues. Msim and Nyal also exhibit characteristics of dominating the position of central connector role as was discussed in Chapter 3. The central connector position exhibits qualities of prominence, prestige and influence (Hanneman & Riddle, 2005). The high in-degree value means many employees connect to Msim and Nyal to seek advice, making these two actors prominent in the internal advisory network, whilst a high out-degree suggests that Msim and Nyal make others aware of their expertise thereby influencing others with their advisory points of view (Hanneman & Riddle, 2005).

Table 5.10: Expert Department–WOR's in-out centrality relations

	OutDegree	InDegree
MSIM	9.000	9.000
NYAL	9.000	9.000
TUNY	5.000	3.000
DEBE	5.000	2.000
GELD	4.000	4.000
ZWAN	3.000	2.000
MCGL	3.000	2.000
DOCR	2.000	5.000
NKOS	2.000	2.000
MPAK	2.000	6.000

Table 5.11 below portrays the overall density of the network, in other words, the level of connectivity in the Expert Department–WOR's internal advisory relations produced a value of 0.49, which translates to 49% connectivity within the network. This value is high and reflects strong connectivity and strong advisory relational flows within the department.

Table 5.11: Expert Department–WOR's overall internal density

The screenshot shows a Notepad window titled 'OUTPUT.LOG1 - Notepad'. The text inside reads: 'DENSITY / AVERAGE MATRIX VALUE'. Below this, there are two lines of text: 'Input dataset: Internal Departmental Connections (C:\Use' and 'Output dataset: Internal Departmental Connections-density'. At the bottom, there is a table with two columns: 'Density' and 'No. of Ties'. The 'Density' value is 0.4889 and the 'No. of Ties' value is 44.0000.

	Density	No. of Ties
Internal Departmental Connections	0.4889	44.0000

In Table 5.12 below, the calculated measured values for the Expert Department–WOR's geodesic distances for each pair of actors is shown. What is notably important to consider is that no more than two steps are required between pairs of actors to ensure the knowledge flows through the network. No bottlenecks in flows are experienced.

Table 5.12: Expert Department–WOR's geodesic distances for internal advisory engagements

		Geodesic Distances									
		1	2	3	4	5	6	7	8	9	10
		D	D	G	M	M	M	N	N	T	Z
1	DEBE	0	1	1	2	1	1	2	1	2	2
2	DOCR	2	0	2	2	2	1	2	1	2	2
3	GELD	2	1	0	2	2	1	2	1	1	2
4	MCGL	2	2	2	0	1	1	2	1	2	2
5	MPAK	2	2	2	2	0	1	2	1	2	2
6	MSIM	1	1	1	1	1	0	1	1	1	1
7	NKOS	2	2	2	2	2	1	0	1	2	2
8	NYAL	1	1	1	1	1	1	1	0	1	1
9	TUNY	2	1	1	2	1	1	2	1	0	2
10	ZWAN	2	2	2	2	1	1	2	1	2	0

Table 5.13 below shows WOR's seven distinct cliques in the advisory network with a minimum size of three employees in each clique. Employees Nyal and Msim are present in all seven cliques. No major work disruptions would occur if the departmental network had to break up as long as Nyal and Msim are present in the clique, the reciprocal advisory engagements would occur regardless of structural changes.

Table 5.13: Expert Department–WOR's advisory cliques

7 cliques found.	
1:	GELD MSIM NYAL TUNY
2:	MCGL MSIM NYAL
3:	MPAK MSIM NYAL
4:	DEBE MSIM NYAL
5:	MSIM NKOS NYAL
6:	DOCR MSIM NYAL
7:	MSIM NYAL ZWAN

In terms of the structure of WOR's departmental network, Figure 5.6 in sociogram resembles that of the mesh structure; the same as Expert Department–EVA's structure. The mesh design is indicative of a close-knit department. The high connectivity is further affirmed by the strong density calculated value of 49% shown in the density Table 5.11. The graph thus validates the accuracy of the density calculation.

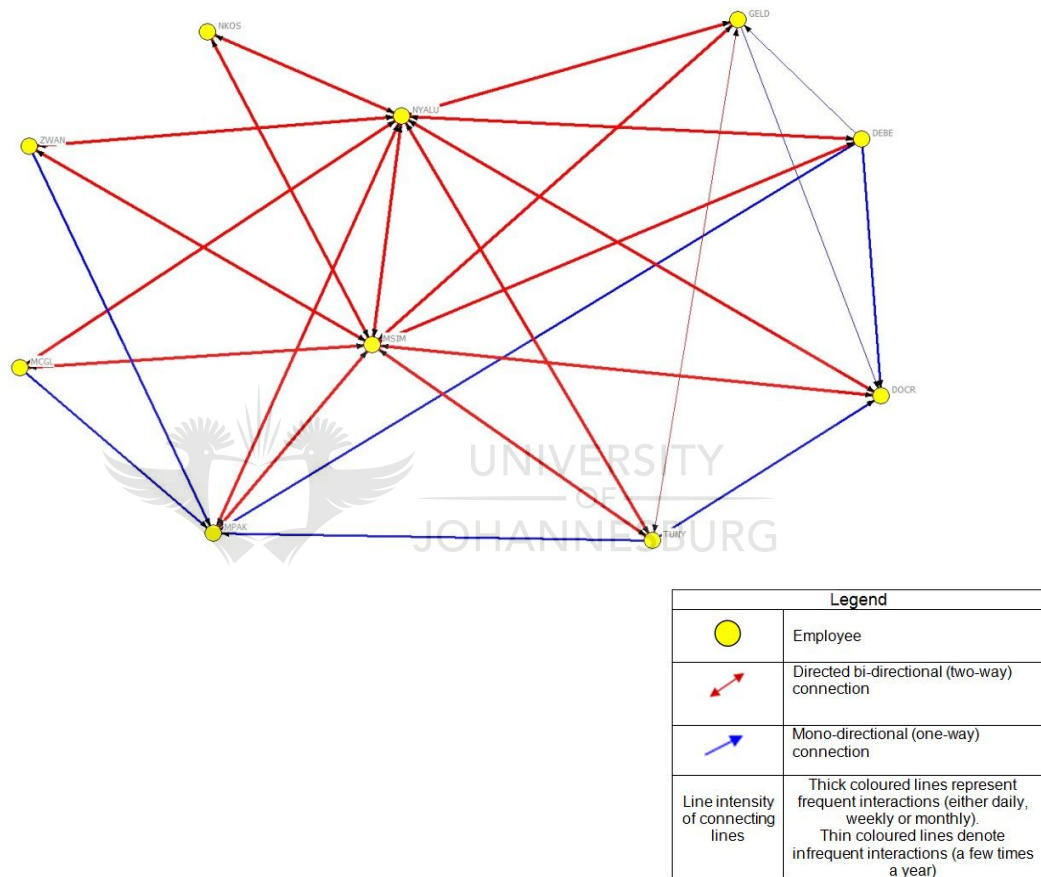


Figure 5.6: Expert Department–WOR sociogram

In Figure 5.6 above, Nyal and Msim both have strong multiple bi-directional advisory relations with their colleagues. These two actors visually show their dominance as central connectors where many employees seek them for advice, and they in turn advise and influence their colleagues. If Nyal and Msim are removed from the sociogram, would the network of this department disintegrate and disrupt work

operations? The answer is no. See Figure 5.7 below. Actors Mpak and Doctr keep the network intact except for one actor, Nkos who becomes an isolate.

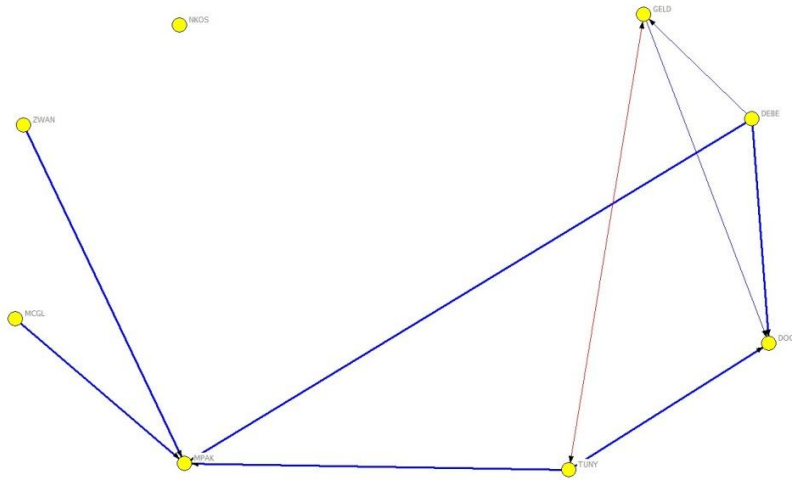


Figure 5.7: Expert Department–WOR sociogram, with Nyal and Msim removed

Based on the above results and interpretations, Nyal, Msim, Mpak and Doctr would probably be good knowledge sharing agents. Zwan, Tuny, Mcgl and Debe could ask for a peer assist from Nyal, Msim, Mpak and Doctr.

5.4.4 Expert Department–WOR (external advisory engagements)

Figure 5.8 on the next page portrays the consultative advisory support SBUs (the red circles) receive from Expert Department–WOR employees (in blue boxes). Six out of ten employees support all 17 SBUs. Some SBUs have multiple engagements with WOR employees. Nyal and Msim have advisory ties with most SBUs, whilst Tuny and Mpak interact to a lesser degree. If three employees are removed from Figure 5.8, and Nyal, Tuny and Mpak remain would the support to the SBUs collapse? The answer is no. See Figure 5.9. These three employees keep the network intact and provide the necessary consultative advisory support to all SBUs.

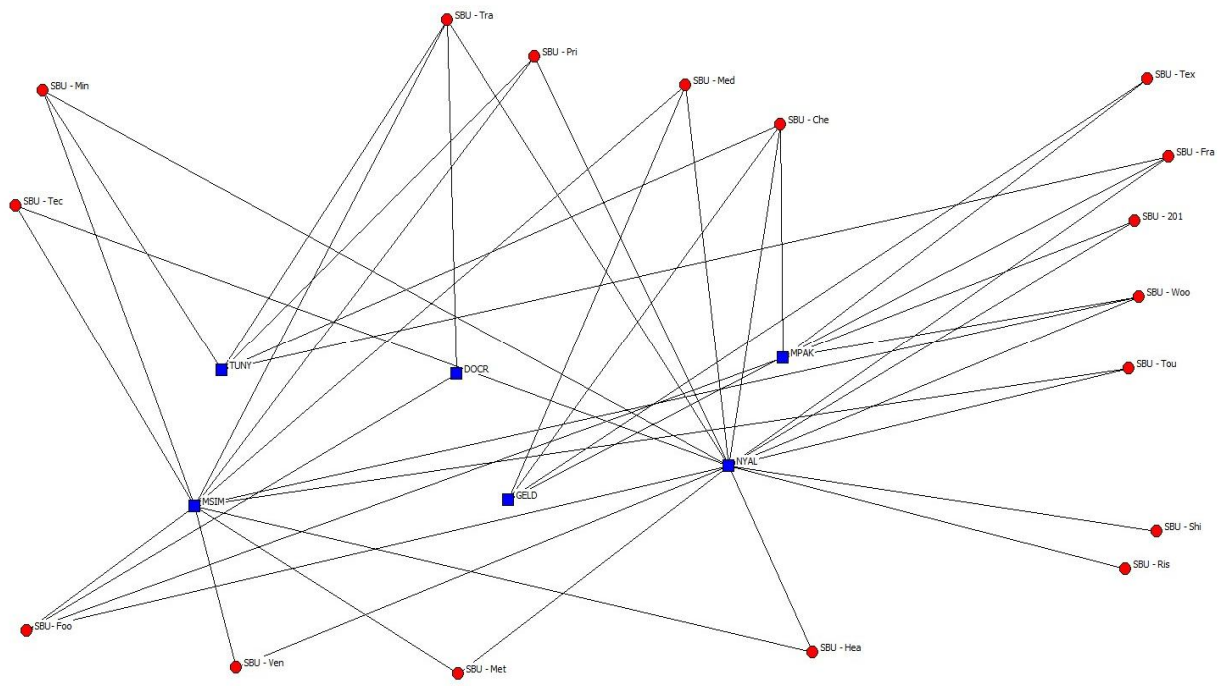


Figure 5.8: Expert Department–WOR sociogram engagement with SBUs

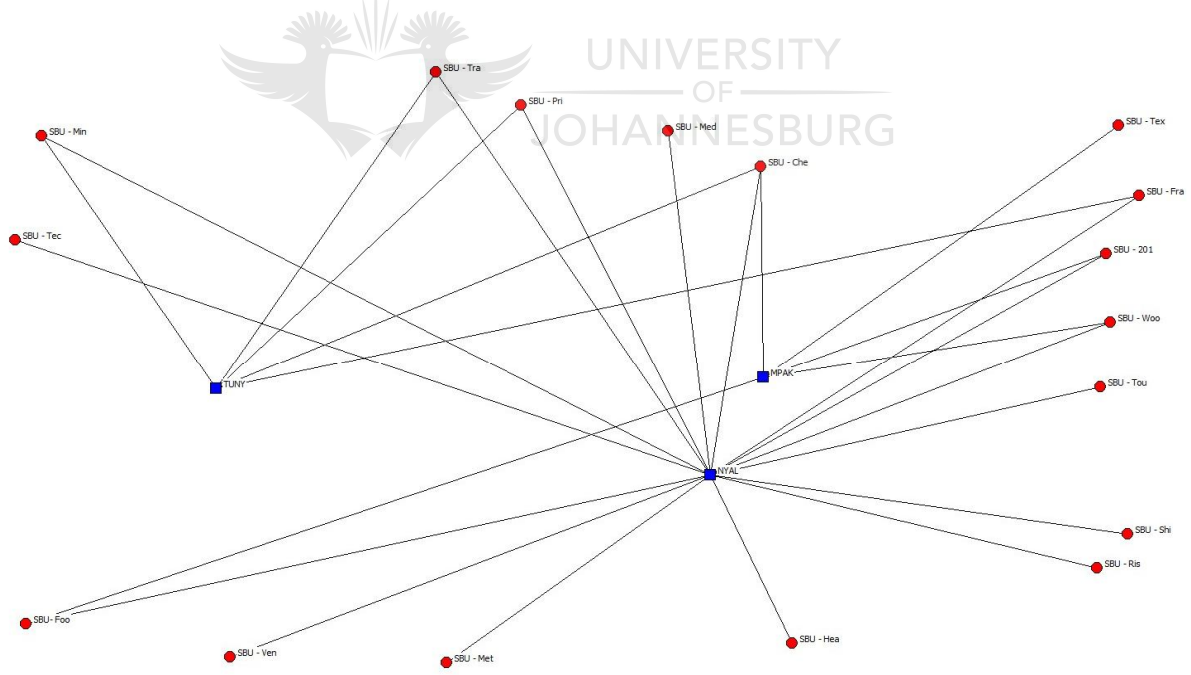


Figure 5.9: Expert Department–WOR sociogram engagement with SBUs, retain Nyal, Mpak and Tuny

Figure 5.8 can also be represented as a quantitative bar chart graph illustrating the cumulative advisory frequency engagements the SBUs receive from WOR's employees. Figure 5.10 depicts this result.

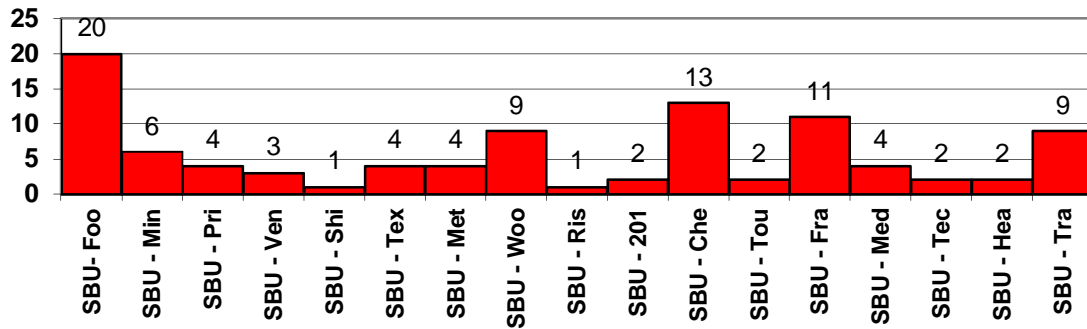


Figure 5.10: Expert Department–WOR bar chart engagement with SBUs

In Figure 5.10 above, the top three SBUs having the highest number of engagements with the Expert Department–WOR are: SBU Foo, SBU Che and SBU Fra.

Based on the above results for external advisory engagements, Nyal, Msim, Mpak and Tuny represent good knowledge sharing agents to start-up CoPs and provide AAR support to SBUs.

5.4.5 Expert Department–ENV (internal advisory engagements)

Table 5.14 below illustrates the consolidated input from the survey data for the internal relations for Expert Department–ENV. The numbers in the table show that the frequencies of the connections are predominantly either weekly or daily (that is, response scale of 3 and higher).

Table 5.14: Expert Department–ENV's internal advisory relations

	MOTH	NAID	NETC
MOTH	0	4	3
NAID	4	0	4
NETC	3	4	0

Table 5.15 below shows the dichotomised binary data for Expert Department–ENV; zero in the cells show absence of a connection, whilst a number one indicates the presence of a relation.

Table 5.15: Expert Department–ENV's internal binary advisory relations

	MOTH	NAID	NETC
MOTH	0	1	1
NAID	1	0	1
NETC	1	1	0

The centrality measure for ENV is portrayed below in Table 5.16. All three individuals display the same equal number of incoming and out-going ties. This threesome group represents a triad (connection between three nodes as mentioned in Chapter 4) as well as a clique in which Moth, Naid and Netc are in direct reciprocal engagements.

Table 5.16: Expert Department–ENV's in-out centrality internal relations

	OutDegree	InDegree
1 MOTH	2	2
2 NAID	2	2
3 NETC	2	2

Table 5.17 below depicts the overall density of the network for Expert Department–ENV. Since every actor is connected to every other actor, the density is naturally calculated to a value of 1 which implies 100% connectivity. Achieving such close connectivity is difficult when the network consists of a larger number of actors in a network as a lot of effort is required to sustain such relations but for a small triad

group, 100% is a perfect value. It shows that actors are collaborating and advising each other on work issues.

Table 5.17: Expert Department–ENV's overall internal density

File Edit Format View Help			
DENSITY / AVERAGE MATRIX VALUE			

Input dataset:	Internal departmental connections (C:\Users\evs\Desktop\ehs\Internal departmental connections)		
Output dataset:	Internal departmental connections-density (C:\Users\evs\Documents\UCINET data\Internal departmental connections-density)		
		Density	No. of Ties
		-----	-----
Internal departmental connections		1.0000	6.0000

In Table 5.18 below, the calculated measured values for the Expert Department–ENV's geodesic distances for each pair of actors is portrayed. As mentioned before in this chapter, the geodesic distance is the most efficient path taken to ensure flow of knowledge. What is distinctive in this triad network is that one needs only take one step to reach the next actor.

Table 5.18: Expert Department–ENV's geodesic distances for internal advisory engagements

Geodesic Distances				
		1	2	3
		M	N	N
		-	-	-
1	MOTH	0	1	1
2	NAID	1	0	1
3	NETC	1	1	0

Table 5.19 shows one distinct clique with a minimum size of three employees in the clique. If the network had to break-up, then this department may not function as optimally as before the break-up. All three individuals rely on each other for advisory support.

Table 5.19: Expert Department–ENV's advisory cliques

CLIQUE	
Minimum Set Size:	3
Input dataset:	Internal departmental connections
1 cliques found.	
1: MOTH NAID NETC	

With regards to the structure of the network, this sociogram in Figure 5.11 resembles that of the triad, indicative of a clique with direct strong reciprocal ties.

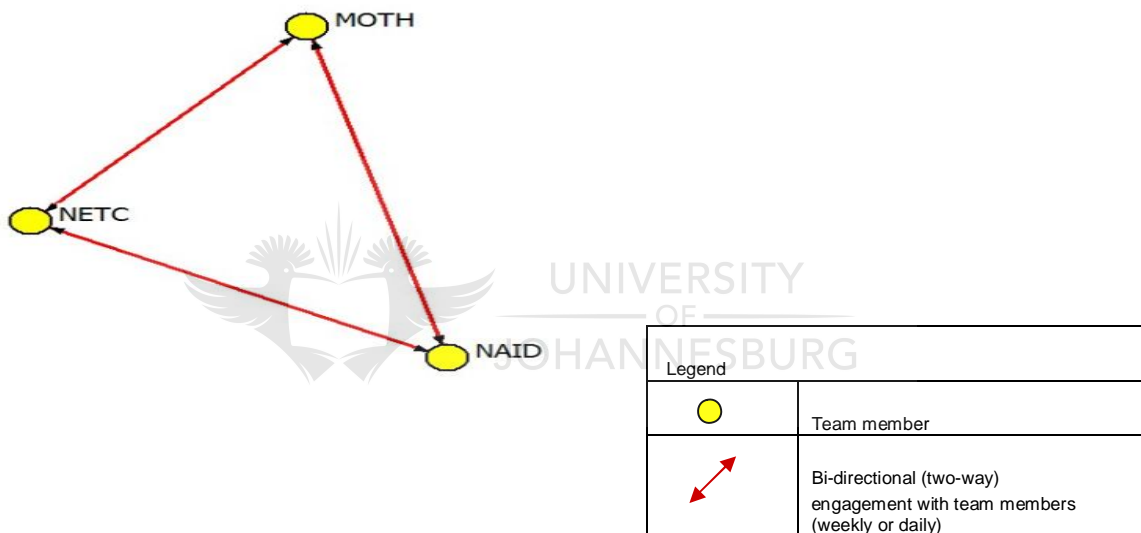


Figure 5.11: Expert Department–ENV sociogram

5.4.6 Expert Department–ENV (external advisory engagements)

Figure 5.12 below portrays the consultative advisory support the SBUs receive from the Expert Department–ENV's employees.

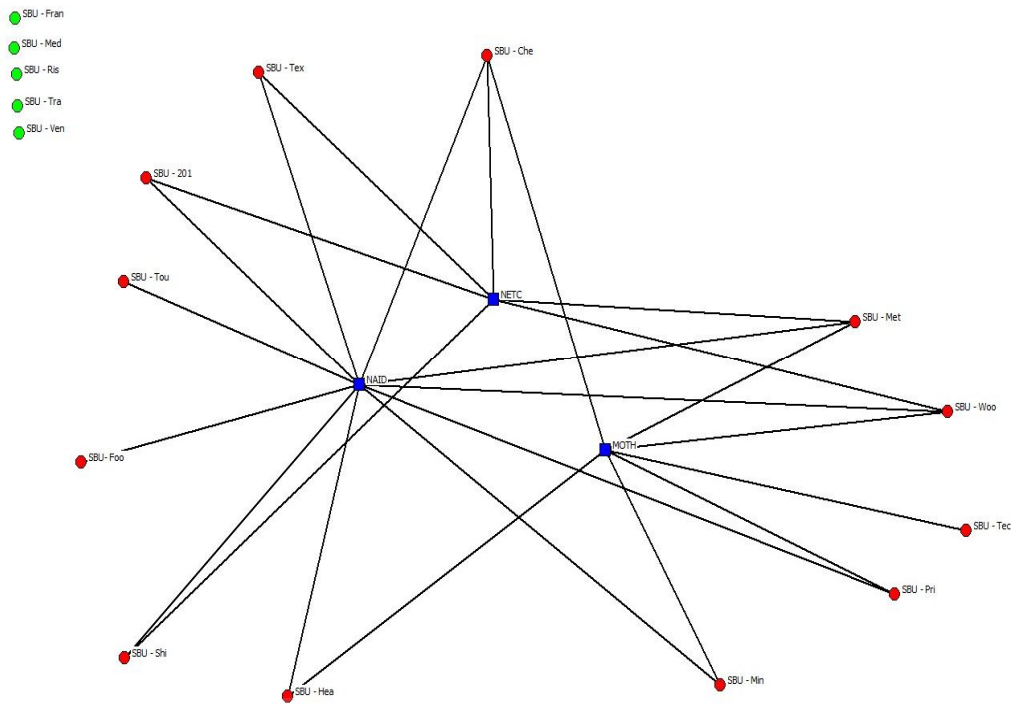


Figure 5.12: Expert Department–ENV sociogram engagement with SBUs

In Figure 5.12 above, the Expert Department–ENV's employees (blue boxes) provide consultative advisory support to 12 out of the 17 SBUs (red circles). The five SBUs (represented as green circles) are isolates and not supported by ENV's employees. All three of ENV's employees engage with some SBUs and some of these SBUs have multiple engagements with the ENV's employees. Naid has the most advisory links with SBUs. If in the network illustrated in Figure 5.12, Netc and Moth are removed, and Naid is retained would the advisory support to the current SBUs collapse? The answer is no. Only one SBU (that is, SBU Tec) disconnects from the network but the rest of the network remains intact by Naid's ties to the SBUs. See Figure 5.13 below.

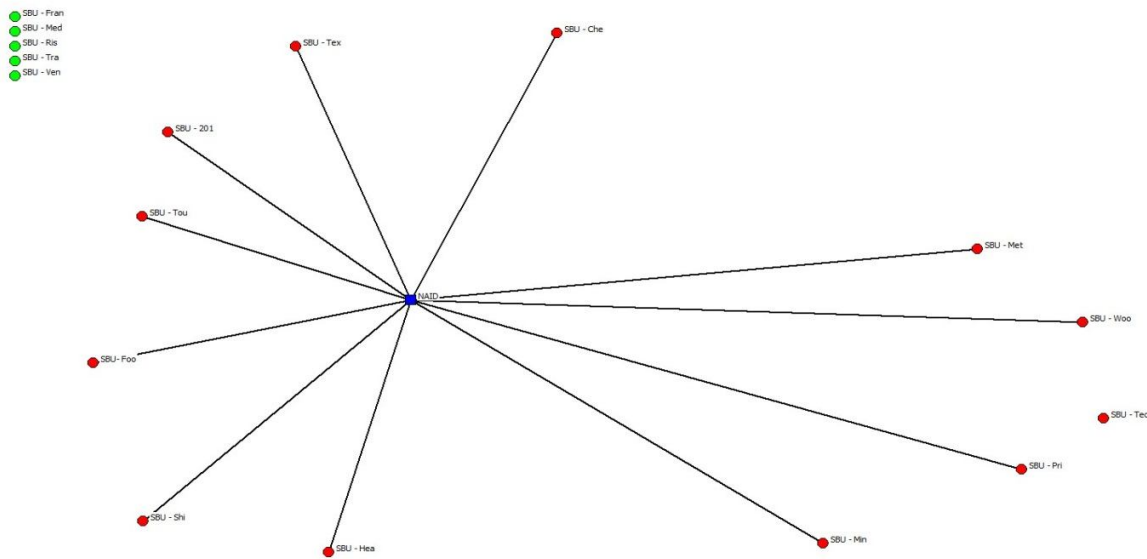


Figure 5.13: Expert Department–ENV sociogram engagement with SBUs, retain Naid

Figure 5.13 can also be represented as a quantitative bar chart graph showing the cumulative advisory engagements ENV's employees provide to each SBU. Figure 5.14 depicts this result below.

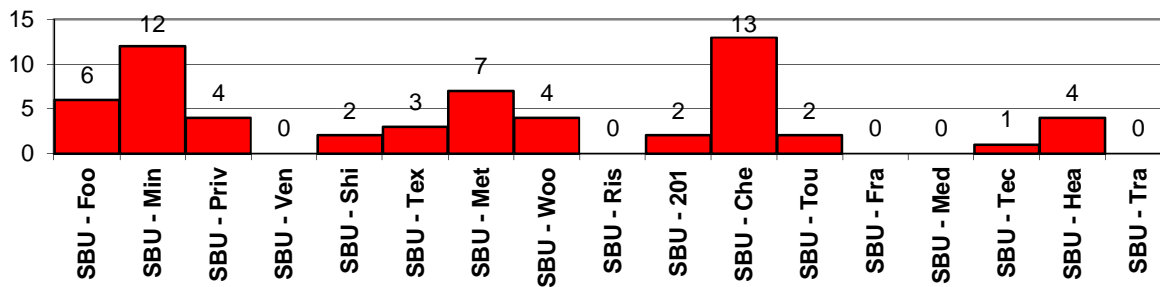


Figure 5.14: Expert Department–ENV bar chart engagement with SBUs

In Figure 5.14 above, the top three SBUs engaging with Expert Department–ENV are: Che, Min and Met.

In summary, for Expert Department–ENV, all three employees collaborate and advise each other and substantially support the SBUs. Naid, in particular is a key advisory central connector player. Naid could be encouraged by The Company's executive leadership to head up a CoP, and together with Naid's departmental colleagues invite all SBUs, including the five isolate SBUs to participate in the community and informally be advised and supported by the expertise of ENV's employees.

5.5 Summary

The consolidated key findings to this investigation revealed the following salient points:

- 1) The frequency of interactions among the employees of each of the Expert Departments are high signifying employees frequently advise, learn and help each other on work related matters.
- 2) Network densities for all Expert Departments exceeded the value of 45% in strength, while geodesic distances among employees did not exceed a value of more than two. Both these results indicate that knowledge and information flows freely and quickly through the networks of the Expert Departments.
- 3) Cliques within Expert-Department networks support the overall departmental network if the network structure had to disintegrate
- 4) Key individuals were identified in the Expert Departments whom play central connector roles within either their own departments and/or across to the SBUs. These identified individuals represent the knowledge sharing agents whom can start-up various sharing interventions (as discussed in Chapter 3) to disseminate and enhance The Company's knowledge base among all employees.

- 5) Visually the departmental sociographs show most employees engage in bi-directional reciprocal interactions, thereby re-enforcing the concept of mutually advisory engagements.
- 6) Visually the Expert-SBU sociographs show that at least 60% of Expert Department employees are indeed approached by SBUs for advisory support.
- 7) Figure 5.15 below depicts collectively how the SBUs approach the three Expert Departments for advice. Ten SBUs have relations with three Expert Departments; five SBUs have relations with two Expert Departments, while two SBUs have relations with one Expert Department each. Based on this observation, it is clearly evident that this organisation does indeed have cross collaborative advisory interactions between Expert Departments and SBUs.

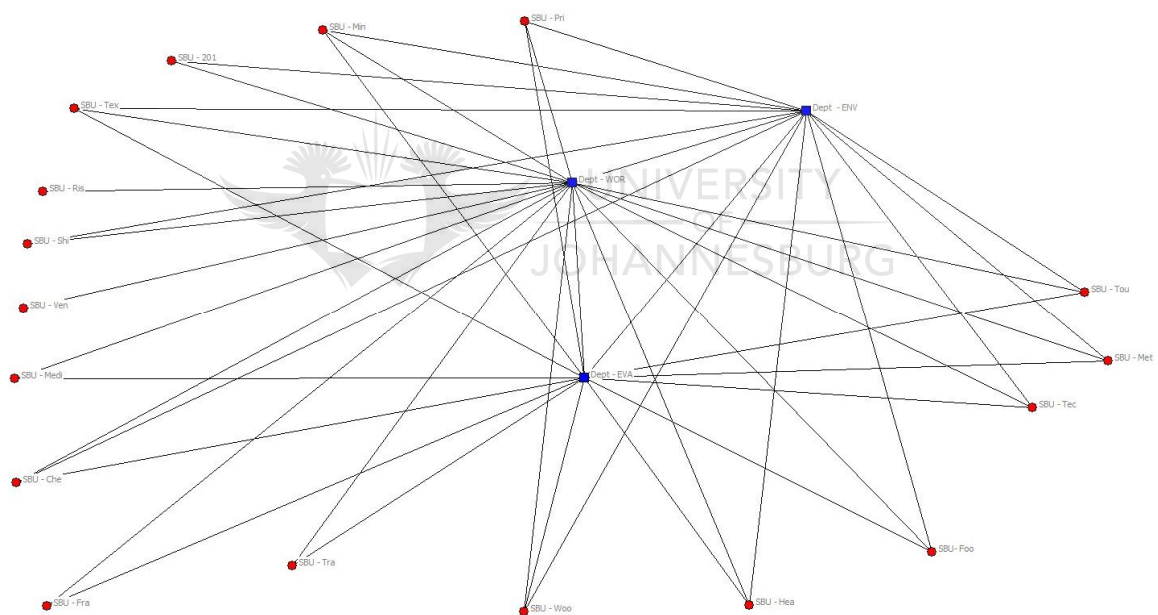


Figure 5.15: SBUs – Expert Departments sociogram, consolidated view

In the presentation of the research findings the researcher's aim was to reach the objective of this study, namely, to unfold the process of discovering the actors in the corporate advisory networks of employees who act as agents for sharing information and knowledge. In summary, this chapter explored the SNA methodology and its

practical application. Chapter 5, therefore effectively responds to the fourth sub-problem, namely-

How does SNA facilitate knowledge sharing through the discovery of corporate advisory networks?

The next chapter provides the conclusion and recommendations of this dissertation.



Chapter 6

Conclusion and recommendations

6.1 Introduction

In the modern corporate environment, critical work activities are increasingly occurring within the informal corporate advisory networks in organisations that are often not well understood and supported by executive leadership. Social network analysis (SNA), as discussed in Chapter 2, is a diagnostic management tool, emanating from social network theory principles that provide the means of visualising and assessing the health of network patterns among individuals, groups or departments in the organisation. In this study, as was reflected in Chapter 5, the advisory networks in the respective Expert Departments as well as the advisory support these departments provide to the strategic business units (SBUs) of The Company was visualised and assessed.

Fundamentally, the research study explored the 'invisible' advisory network patterns of interaction in the organisation and made them 'visible' to The Company's executive leadership. The researcher could then advise leadership on how to use this assessment to leverage off the networks in order to ensure more effective sharing of information and advisory knowledge flows through the networks of the Expert Departments and through the interface networks between Expert Departments and SBUs.

Knowledge sharing interventions can be introduced to improve specific areas of collaboration in the business, thereby yielding higher work performance levels for all employees in The Company and enabling them to meet organisational strategic work objectives.

This dissertation addressed effectively the main research problem of this study, namely-

How can SNA be used to discover the corporate advisory networks of employees to enhance information and knowledge sharing?

Substantive evidence was given on how to apply and use the methodology of SNA to discover the corporate advisory networks of employees in the empirical investigation discussed in Chapter 5. The findings of the SNA study revealed the network patterns and identified critical employees in the Expert Departments who could assume the knowledge sharing agent role to start-up formal knowledge sharing programs in the organisation.

6.2 Concluding remarks on corporate knowledge sharing

In the literature, discussed in Chapter 3, it was found that knowledge sharing is the most critical success factor of all knowledge management activities because effective knowledge sharing practices make knowledge available to other individuals within the organisation to re-use and regenerate knowledge.

In corporate environments, effective information and knowledge sharing entails that critical key employees, such as individuals identified in the networks that hold central connector, broker and peripheral role positions, share and transfer their task-driven and expert advisory knowledge to help their colleagues execute their work activities. In the context of this study, the employees identified as central connectors in the Expert Departments could help other colleagues in their own departments and assist SBUs of The Company with task-driven advisory knowledge. The knowledge that is shared is fundamentally linked to finding solutions to solve work-based problems or to re-formulate problems by making them less complex to understand and solve.

Other advisory activities could involve employees seeking out network players to obtain relevant meta-knowledge and acquire insight on how to implement The

Company's policies and procedures successfully in order for them to execute on their work objectives.

In addition, the critical key employees identified in the SNA study, could be motivated by The Company executive leadership to act as sharing agents and to start-up formal knowledge sharing programs within the established advisory network structures.

6.3 Recommendations

This research project provided an overview of social network theory and SNA methodology and investigated its practical application in the establishment of corporate advisory networks in The Company.

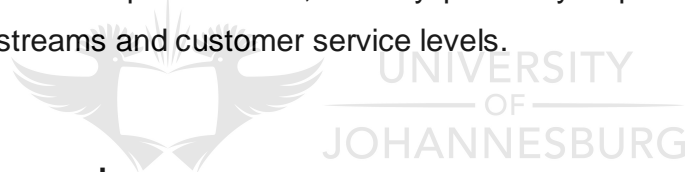
Based on the findings of this study, the executive leadership of The Company could be advised to consider the following interventions going forward:

- Formally appoint central connectors identified in the study and award them the title of 'Knowledge Champions' in The Company to change the culture of the organisation to one where increased flows of knowledge will drive an improvement in overall work performance levels of all employees.
- The knowledge champions would be rewarded quarterly with small monetary incentives for the additional duties they assume in the establishment and implementation of formal knowledge sharing interventions.
- The sharing interventions would include the establishment of formal communities of practice that are domain specific and aligned to the champion's competency and expertise areas.
- Within the communities, regular face-to-face meetings would be held to discuss topics of interest or to resolve burning work issues. The discussions

could follow the approach of peer assists, after actions reviews (AARs) and storytelling sessions sharing events.

- Knowledge champions would also share their personal experiential knowledge by regularly preparing and presenting on specific work topics. The presentations could be video recorded and used as reference learning material. This material could be used to onboard new employees that join The Company to acclimatise them to The Company's areas of expertise.
- As and when required, knowledge champions would also avail themselves to individual employees across The Company to help and advise them on specific work related issues.

If the above recommendations are indeed executed, over time, the executive leadership of The Company would foresee an enhancement in employees' capabilities and overall performance, thereby positively impacting The Company's revenue, profit streams and customer service levels.



6.4 Future research

Networks are an essential feature of organisations, responsible in large part for organisational effectiveness in meeting strategic work objectives. As a result, a bright future for organisational network research is envisaged for both internal organisational relationships and external relationships with other organisations and/or other entities. External network relationships could be broadened to include partnerships with customers, suppliers, competitors and regulatory and governmental bodies.

As networks become a more recognised part of organisational life, they will evolve to become more targeted and sophisticated. Networks may in future be designed by executive leadership with a focus to specific value propositions. For instance, a network designed to provide highly customised expertise to clients might have a

dense pattern of connectivity with the utilisation of technologies that allow the network members sense customers' needs and rapidly respond with relevant expertise regardless of physical location. In contrast, a network designed to respond to routine low cost solutions will be more efficient if it has fewer relationships and a technical infrastructure to support repetitive work. These are but two of numerous possible network configurations with socio-technical aspects compromising human and non-human networks to be further investigated.

It is also envisaged that executives will begin to manage their own personal connectivity in order to develop into high performing executives. The information and advice on which executives take action comes from their personal networks. Being an effective decision maker, means that executives should receive diverse information from their networks, weigh their opinions and views and only then take action. Executives who do not have diverse networks may become too insular in their thinking and become ineffective leaders.

In conclusion, the study of social networks in and between organisations encompasses the professional interests of human behaviour. Human beings are by their very nature social creatures for whom relationships are defining elements of their identities and creativeness. The study of such relationships is really the study of human nature itself; SNA methodology simply provides a practical way to studying this phenomenon. In the corporate environment, organisational network analysis is a technique applied to leverage of making invisible human relations, visible.

In general, the application of SNA methodology leads to the surfacing of the corporate advisory networks of knowledge sharing agents which can be leveraged to the benefit of any organisation in any industry.

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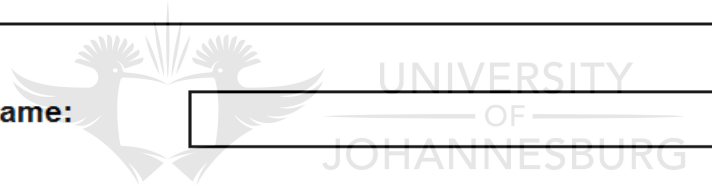
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Formal Questionnaire: Expert Department–EVA

<p>Social Network Questionnaire</p> <p>The Company in the process of gathering information on how the advisory engagements occur within & across The Company. You have been identified as a valued participant and would appreciate it if you could please take a few minutes of your time to manually complete this survey and answer the questions to the best of your ability. Thank you!!</p> <p>When you are done, hand it in to the Researcher.</p>
--

Your full name:



Please turn over for Question 1.

Frequency Table: Response Scale for Question 1.

1 = I interact with them a few times a year	
2 = I interact with them at least once a month	
3 = Interact with them weekly	
4 = I interact with them almost daily	
<p>Question 1. From the roster names below select which individual(s) from inside your own Expert Department do you approach for advice on work related matters? Remember to write the frequency response number next to each person's name you have selected. For individual(s) you do not solicit advice from, leave a blank space next to their name.</p>	
Name of Employee in Expert Department - EVA	Frequency Number (based on the Response Scale Number above)
CHIM	
ERAS	
MACL	
MFEK	
MNCW	
MNIS	
MOEK	
MUDA	
SASA	

Please turn over for Question 2.

Question 2.

Select which SBU(s) approach you for advice on work related matters? Remember to write the average number of interactions per month you have provided advisory support next to each SBU name. If you are not solicited for advisory support from SBU(s), leave a blank space next to the SBU name(s).

SBU Name	Number of interactions per month
SBU - Foo	
SBU - Min	
SBU - Pri	
SBU - Ven	
SBU - Shi	
SBU - Tex	
SBU - Met	
SBU - Woo	
SBU - Ris	
SBU - 201	
SBU - Che	
SBU - Tou	
SBU - Fra	
SBU - Med	
SBU - Tec	
SBU - Hea	
SBU - Tra	

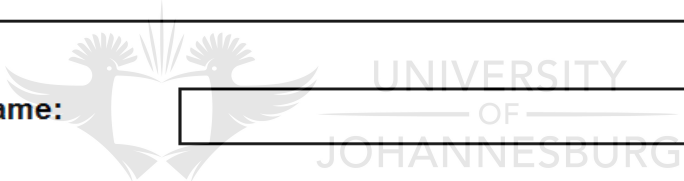
Formal Questionnaire: Expert Department–WOR

Social Network Questionnaire

The Company in the process of gathering information on how the advisory engagements occur within & across The Company. You have been identified as a valued participant and would appreciate it if you could please take a few minutes of your time to manually complete this survey and answer the questions to the best of your ability. Thank you!!

When you are done, hand it in to the Researcher.

Your full name:



Please turn over for Question 1.

Frequency Table: Response Scale for Question 1.

1 = I Interact with them a few times a year	
2 = I interact with them at least once a month	
3 = Interact with them weekly	
4 = I interact with them almost daily	
<p>Question 1. From the roster names below select which individual(s) from inside your own Expert Department do you approach for advice on work related matters? Remember to write the frequency response number next to each person's name you have selected. For individual(s) you do not solicit advice from, leave a blank space next to their name.</p>	
Name of Employee in Expert Department - WOR	Frequency Number (based on the Response Scale Number above)
DEBE	
DOCR	
GELD	
MCGL	
MPAK	
MSIM	
NKOS	
NYAL	
TUNY	
ZWAN	

Please turn over for Question 2.

Question 2.

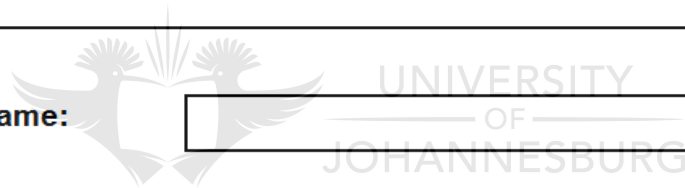
Select which SBU(s) approach **you for advice on work related matters?** Remember to write the **average number of interactions per month** you have provided advisory support next to each SBU name. If you are not solicited for advisory support from SBU(s), leave a blank space next to the SBU name(s).

SBU Name	Number of interactions per month
SBU - Foo	
SBU - Min	
SBU - Pri	
SBU - Ven	
SBU - Shi	
SBU - Tex	
SBU - Met	
SBU - Woo	
SBU - Ris	
SBU - 201	
SBU - Che	
SBU - Tou	
SBU - Fra	
SBU - Med	
SBU - Tec	
SBU - Hea	
SBU - Tra	

Formal Questionnaire: Expert Department–ENV

Social Network Questionnaire
<p>The Company in the process of gathering information on how the advisory engagements occur within & across The Company. You have been identified as a valued participant and would appreciate it if you could please take a few minutes of your time to manually complete this survey and answer the questions to the best of your ability. Thank you!!</p>
<p>When you are done, hand it in to the Researcher.</p>

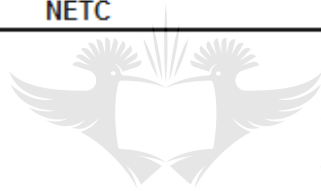
Your full name:



Please turn over for Question 1.

Frequency Table: Response Scale for Question 1.

1 = I interact with them a few times a year	
2 = I interact with them at least once a month	
3 = Interact with them weekly	
4 = I interact with them almost daily	
<p>Question 1. From the roster names below select which individual(s) from inside your own Expert Department do you approach for advice on work related matters? Remember to write the frequency response number next to each person's name you have selected. For individual(s) you do not solicit advice from, leave a blank space next to their name.</p>	
Name of Employee in Expert Department - EHS	Frequency Number (based on the Response Scale Number above)
MOTH	
NAID	
NETC	



UNIVERSITY
OF
JOHANNESBURG

Please turn over for Question 2.

Question 2.

Select which SBU(s) approach **you for advice on work related matters?** Remember to write the **average number of interactions per month** you have provided advisory support next to each SBU name. If you are not solicited for advisory support from SBU(s), leave a blank space next to the SBU name(s).

SBU Name	Number of interactions per month
SBU - Foo	
SBU - Min	
SBU - Pri	
SBU - Ven	
SBU - Shi	
SBU - Tex	
SBU - Met	
SBU - Woo	
SBU - Ris	
SBU - 201	
SBU - Che	
SBU - Tou	
SBU - Fra	
SBU - Med	
SBU - Tec	
SBU - Hea	
SBU - Tra	

–End–