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Developing an organizational decision making model: the impact of organizational structures, decision types, and the social network

John Huggins

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By

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Organizational decision making can be seen as a complex process due to the fact that decisions across organizational levels are generally interdependent, and have effects ranging from immediate to long-lasting. Reviewing decision making mathematical and process models, decision making is fundamentally characterized by multiple decision making steps from encountering a problem to determining a course of action. The first objective of this dissertation was the determination of the decision making model that a certain type of organization uses, and the establishment of a foundation for an organizational decision model framework.

Decision making can be classified into three decision types: strategic, tactical, and operational. These types of decisions can be made throughout the organization ranging from an executive board to operating floor managers. A second objective of this dissertation was the determination of the decision making model that is used to make a certain decision type, and the continued development of an organizational decision making model framework.

Beyond decision making occurring within the "traditional" organization structure, decision making can be influenced and occurs within the organizational social groups. These social networks established within the parent organization can make similar decisions to ones

made within the "traditional" organizational structure. Metrics of social network analysis (SNA) were used to characterize the configuration of social networks associated with different organizational structures and types of decisions being made in the organization. These metrics showed organizational social networks had the same composition regardless of organizational structure and decision type, with one outlier that social networks would comprise of organizational members making the same type of organizational decision.

The first two studies developed an organizational decision making model, respectively. These two studies' results showed none of the five researched decision making models being representative of how an organization makes decisions. Ultimately, these studies' results allowed a new organizational decision making model to be constructed.

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CHAPTER I

DECISION MODELS AND ORGANIZATIONAL STRUCTURE EVALUATION

1.1   Introduction

How do organizations from a small business to an international corporation make their decisions? Regardless of the organization's structure, decision making can be seen as a complex process due to the fact that decisions across organizational levels are generally interdependent, and have effects ranging from immediate to long-lasting. Decisions made from one organizational level can affect the decisions across organizational levels, and are/will be affected by past and future organizational decisions. The multi-level organizational decision making was illustrated by a mathematical model represented by the following steps: 1) Analyze the problem, 2) Determine all possible scenarios, 3) Determine cooperation conditions between organizational levels, 4) Determine each scenario's optimal share of cooperation between organizational levels, and 5) Determine the expected rewards of the scenario (Wernz et. al., 2012). Reviewing decision making mathematical and process models, decision making is fundamentally characterized by multiple decision making steps from encountering a problem to determining a course of action. Based on an organization's structure, does an organization adhere to a specific decision making model in determining a course of action to solve the organizational problem?

1.1.1   Study Objective

This study's objective is to understand the relationship between decision making models and organizational structures. This study will utilize a use case to support an interview

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questionnaire of engineering or technical managers to collect data to understand the strength of the relationship between an organizational structure and the decision models. The outcome of this study will be the determination of the decision making model that a certain type of organization uses, and the establishment of a foundation for an organizational decision model framework.

1.1.2   Existing Decision Making Models

Decision models are comprised of varying numbers of steps generally ranging from a first step of "defining a problem" to a last step of "selecting a course of action." These decision model steps can be characterized by decision making considerations shown in Table 1.1.

Table 1.1   Decision Making Considerations (March, 1991)

Term	Definition
Alternatives	An organization has multiple courses of action to select from
Consequences	An organization understands the consequences associated with the different courses of action
Consistent Preference Ordering	An organization has a consistent means to compare courses of action
Decision Rule	An organization has rules to decide on a single course of action based on the consequences and preferences of all potential courses of action

These decision making considerations are similar for either an individual or an organization, since either investigates possible alternatives and consequences of those alternatives during their decision making process.

Looking beyond the individual decision making process, is there a representative model to how an organization makes a decision? Previous research includes describing an organizational decision making process in three ways through the lens of the October 1962 Cuban Missile Crisis: Rational actor model, organizational process model, and government

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politics model. The Rational actor model was built on the assumption each organization (e.g. U.S. and USSR governments) was making decisions acting as rational decision makers. The organizational process model was built on the premise that organizations make decisions based on their organizational routine. This organizational routine is represented by the "standard" practices of the organization. The government politics model viewed decision making as a "bargaining game" among organizational leaders involved in the decision making process (Allison, 1971) (Kuwashima, 2014).

Other organizational decision making process research leads to decision theory and decision making going through these three steps: 1) Decision makers find available alternative plans, 2) Decision makers predict consequences of choosing alternatives, and 3) Decision makers choose an alternative based on preference. These three steps were modified into the modern organizational theory model represented by these three steps: 1) Decision maker considers only two or three alternatives, 2) Decision makers adopts an alternative if it satisfies certain criteria, and 3) If the alternatives fail to satisfy the criteria, the decision maker explores additional alternatives. This model represents a possible "optimal" decision making model that could be representative to how an organization makes a decision (Lynn, 1982) (Kuwashima, 2014).

These decision making models represent different processes for how an organization could make a decision. A question to be asked: is there a different model depending on the organizational perspective or is there an optimal model to represent the organizational decision making process (Kuwashima, 2014)?

This study builds on the last question from the previous paragraph through the determination if an organization adheres to a specific decision making model in selecting a course of action to solve the organizational problem based on the organization's structure

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(focused on engineering or technical managers)?   This study reviews five decision making models, representative of an individual's decision making process, to determine if one of these decision making models could be representative of how an organization, focusing on the organizational structure, makes a decision. The five decision making models researched to support the development of an organizational decision making model include Normative, Descriptive, Creative, Evidence-Based, and Rational. Examples representing general situations that these decision making models are used include: Creative – courses of action to solve the problem are not clear, and Rational – information on the courses of actions can be gathered and quantified (Erdogan, et al., 2010).

1.1.2.1   Normative

Normative decision making is coupled with mathematical models allowing the evaluation of decision judgements against standards (Baron, 2004). Normative decision making models (including utility theory) are assessed by their theoretical accuracy, defined as the model's capability to provide acceptable idealizations (Bell et. al., 1988). An example of a normative decision making model, shown in Figure A.1, can be decomposed into four steps: 1) Structure the decision problem; 2) Assess possible impacts of each alternative; 3) Determine preferences of decision making; and 4) Evaluate and compare alternatives (Keeney, 1982)

1.1.2.2   Descriptive

Descriptive decision making can also be coupled with mathematical modeling, which concentrates on how and why individuals think and act. A common definition of descriptive decision making model is an abstraction asserting to describe an individual's behavior (Bell et. al., 1988). One well-researched area of descriptive decision making is naturalistic decision

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making, expressed as the study of how experienced individuals or groups work in dynamic and uncertain environments, and assess the situation, make decisions, and take actions (Zsambok et al., 2014). The Recognition-primed decision making model represents a primary naturalistic decision making model example, shown in Figure A.2. This naturalistic decision making model will be used as the representative decision making model for Descriptive decision making in this study.

1.1.2.3   Creative

Creative decision making is focused around individuals or groups generating new, imaginative ideas. A Creative decision making model is shown in Figure A.3, and is represented by five steps: 1) Problem Recognition – the decision maker recognizing the need for problem solving; 2) Immersion – the decision maker thinks about the problem consciously and gathers information; 3) Incubation – the decision maker sets the problem aside and does not think about it consciously. The decision maker's brain is postulated to be working on the problem subconsciously; 4) Illumination – the problem's solution becomes apparent to the decision maker (otherwise known as the "eureka" moment); 5) Verification and Application – the decision maker consciously verifies the solution's feasibility and implements the decision (Carpenter et al., 2009).

Three factors are considered in evaluating the Creative decision making model. The first factor is fluency; defined as the number of ideas an individual is able to generate. The second factor is flexibility; defined as how different the ideas are from one another. An example is if an individual is able to generate numerous distinctive courses of actions that can be used to solve the identified problem, that process following the Creative decision making model is considered

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to have high flexibility. The third factor is originality; defined as how unique an individual's ideas are (Erdogan, et al., 2010).

1.1.2.4   Evidence-Based

Evidence-based decision making represents a process when an individual or group conscientiously uses the best available data and evidence when making decisions. A five-step evidence-based decision making model is shown in Figure A.4, and begins with a decision maker gathering internal and external evidence about the identified problem. This gathered information is subsequently integrated with stakeholder information, implications about the possible decision are considered, and ultimately a decision is made (Kreitner et al., 2012).

1.1.2.5   Rational

Rational decision making represents when a decision maker is choosing among alternatives in a way aligning with their preferences. Furthermore, Rational decision making involves unanalyzed alternatives and associated preferences reflecting the desirability of an alternative and the rationality criteria, such as maximum desirability of a selected alternative with respect to a preference ranking (Doyle, 1997). An eight-step rational decision making model is shown in Figure A.5, and is represented by the following use case:

"Let's imagine that your old, clunky car has broken down and you have enough money
saved for a substantial down payment on a new car. It is the first major purchase of your
life, and you want to make the right choice. The first step, therefore, has already been
completed—we know that you want to buy a new car. Next, in step 2, you'll need to
decide which factors are important to you. How many passengers do you want to
accommodate? How important is fuel economy to you? Is safety a major concern? You

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only have a certain amount of money saved, and you don't want to take on too much debt, so price range is an important factor as well. If you know you want to have room for at least five adults, get at least 20 miles per gallon, drive a car with a strong safety rating, not spend more than $22,000 on the purchase, and like how it looks, you've identified the decision criteria. All of the potential options for purchasing your car will be evaluated against these criteria."

"Before we can move too much further, you need to decide how important each factor is to your decision in step 3. If each is equally important, then there is no need to weight them, but if you know that price and gas mileage are key factors, you might weight them heavily and keep the other criteria with medium importance. Step 4 requires you to generate all alternatives about your options. Then, in step 5, you need to use this information to evaluate each alternative against the criteria you have established. You choose the best alternative (step 6) and you go out and buy your new car (step 7)."

"Of course, the outcome of this decision will be related to the next decision made; that is where the evaluation in step 8 comes in. For example, if you purchase a car but have nothing but problems with it, you are unlikely to consider the same make and model in purchasing another car the next time (Carpenter et al., page 431, 2009)."

The Rational decision making model ultimately represents decision making steps for an individual to consider if the individual is attempting to choose an alternative that maximizes the quality of the outcome (Erdogan, et al., 2010)

1.1.3   Review of Organizational Structures

Beyond investigating the decision making models, organizational structures impact the organizational decision making process because an organizational decision maker(s) can impact

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decisions across the organizational regardless of organizational level. To understand the impact of organizational structures on the decision making process, four types of organizational structures, including functional, divisional, matrix, and flat have been researched. However, an organization may be a hybrid structure and not solely characterized by one organizational structure, such as an organization may have functional attributes, such as aligned based on similar skills, and may have matrix attributes, such cross-organizational integration between teams.

1.1.3.1 Functional

Functional organizational structures, example shown in Figure 1.1, are arranged by aligning people with similar skills into a functional area and within these functional areas, similar tasks are performed. Some functional organization advantages include efficient organizational resource usage within and across functional areas, and consistent assignment of appropriate tasks based on skill expertise. Some functional organization disadvantages include functional "stovepipes," where a functional area coordinates and problem-solves within its management chain without extending horizontally to other functional areas, and reliance on decision making at higher levels of the management chain, potentially slowing down decision making (Lombardi, et al., 2006).

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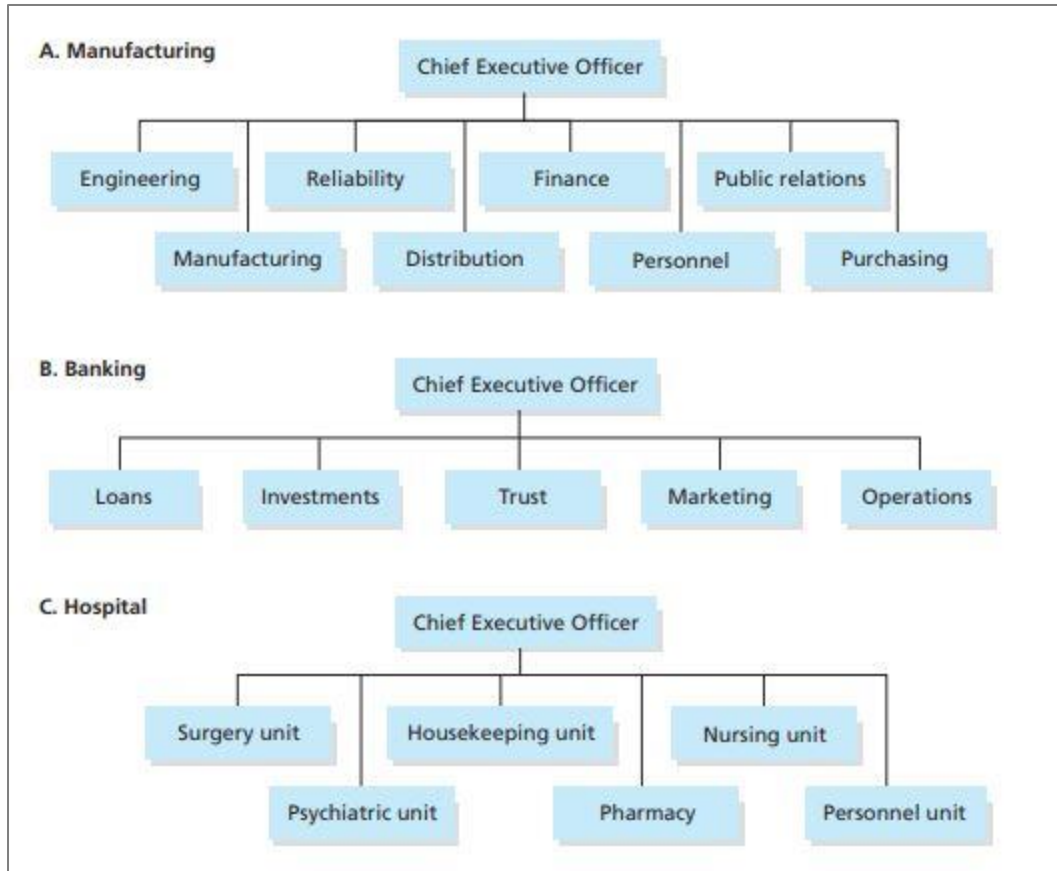
Figure 1.1   Functional Organizational Structure Example (Gibson, et al., 2009)

1.1.3.2   Divisional

Divisional organizational structures, examples shown in Figure 1.2, are configured in the following ways: organizational entity providing similar services, organizational entity supporting similar clients or customers, organizational entity operating within the same processes, and organizational entity located in the same geographical area. Some divisional organization advantages include effective communications across divisional departments, flexibility with organizational size changes (e.g. removing or adding a division), and defined responsibility for delivery of services or products. Some divisional organization disadvantages include reduction

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in organizational efficiencies and increase in costs due to duplication of resources (e.g., a geographic-based divisional organization may need a specialized skill employee at each branch spread throughout a region compared with a centralized location with fewer required specialized skill employees). Additional disadvantages include employee tasking across divisions, and internal competition amongst the divisions for resources and for attention (Lombardi, et al., 2006).
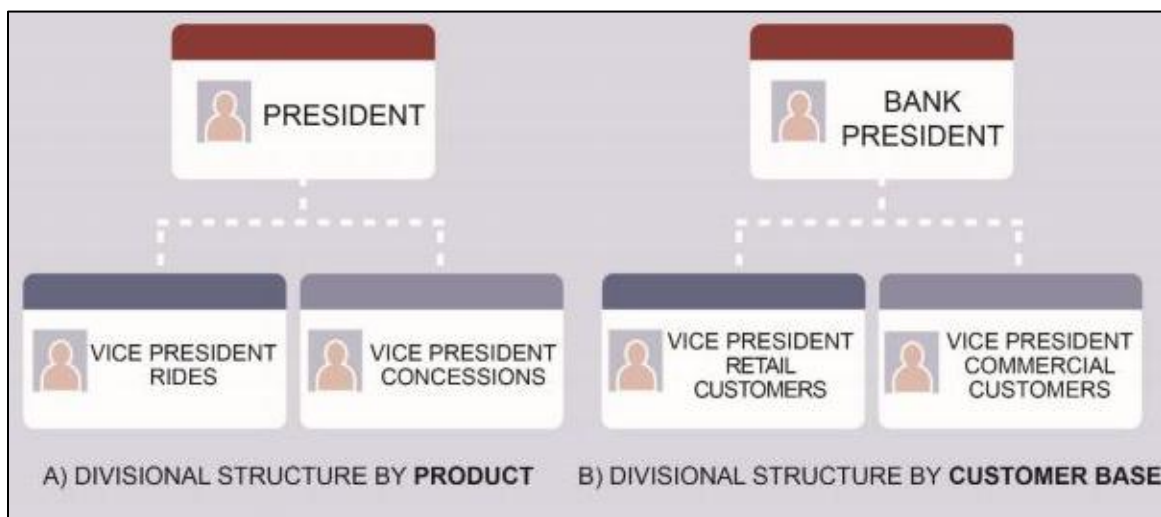
Figure 1.2   Divisional Organizational Structure Example (Skripak, 2016)

1.1.3.3   Matrix

Matrix organizational structures, example shown in Figure 1.3, are arranged by cross-functional teams, which integrate functional capabilities with a divisional emphasis. Some matrix organization advantages include increased inter-functional cooperation across the organization, improved performance accountability through the organization's project managers, and the possibility of improved strategic management by higher level managers who can focus

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on strategic organizational goals and have lower-level managers focus on operational and tactical organizational goals. Some matrix organization disadvantages include the multi-supervisor conflict, where functional supervisors and project managers vie over personnel resources, and employees struggling with task prioritization due to inputs from multiple supervisors (Lombardi, et al., 2006).
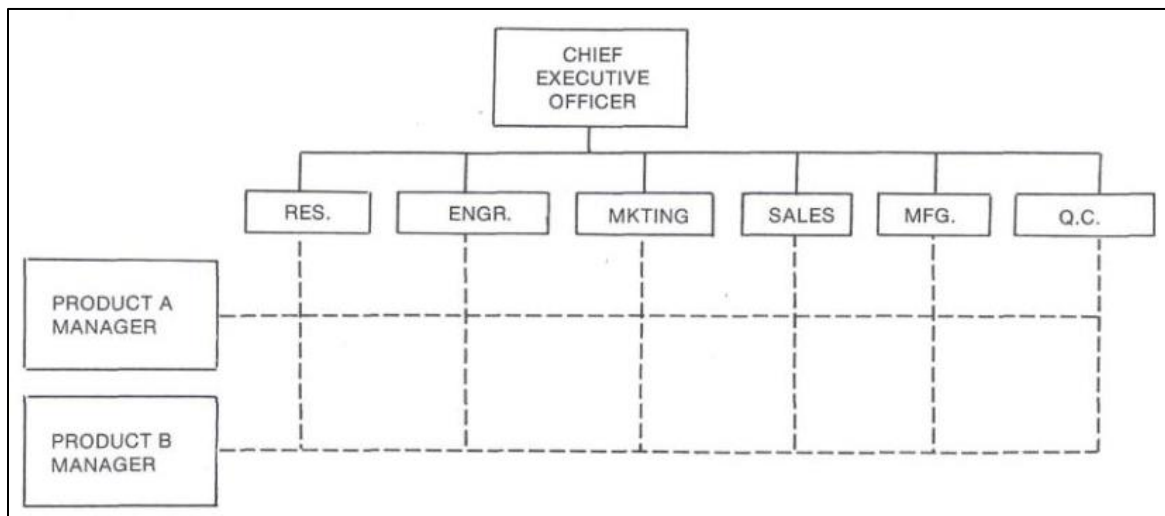
Figure 1.3   Matrix Organizational Structure Example (Stuckenbruck, 1979)

1.1.3.4   Flat

Flat organizational structures, example shown in Figure 1.4, are constructed by one or few levels of management, resulting in a manager having a large number of employees under their supervision. Some flat organization advantages include possible high employee motivation due to the perception an employee has a direct influence on the organization, easier strategic management plan implementation due to fewer management levels, and more adaptable employees due to the smaller management chain and less bureaucracy. Some flat organization

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disadvantages include less leader mentorship due to fewer managers giving guidance and instruction to their employees. Possible issues with decision making arise if the organization relies on building consensus among its employees to reach a decision or needs to make a decision with long-term consequences, thus finding it difficult to do it in a timely and decisive manner (Rishipal, 2014).
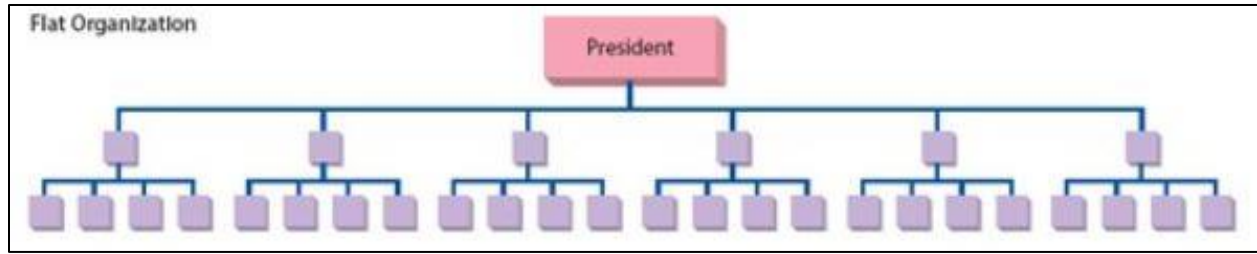
Figure 1.4   Flat Organizational Structure Example (Griffin, 2006)

1.2   Methods

This section will discuss this study's data collection method, a use case to support the data collection method, and the evaluation method to understand the relationships among decision models and organizational structures.

1.2.1   Interview Questionnaire

The interview questionnaire, shown in APPENDIX B, was used as the data collection method to support the evaluation between decision models and organizational structures. Interviewees were selected based on being an engineering or technical manager and being a member in one of the organizational structures discussed in Section 1.1.3. Eight interviews were conducted for Study 1. The eight interviews were associated with the following organizational structures shown in Table 1.8.

Mississippi State University Institutional Review Board (IRB) reviewed this interview questionnaire with study number IRB-18-390, "Developing an Organizational Decision Making Model." The Mississippi State University IRB determined IRB approval was not required for this interview questionnaire.

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The interviewees were provided a read-ahead presentation, shown in APPENDIX C, which included material about the five decision models, four organizational structures, and the use case described in 1.2.2.

Though described in Section 1.1.3.4, no interviews for this study included a representative from a flat organization; however, the third study in this dissertation includes survey respondents that selected their organizational structure as a flat organization. The dissertation conclusion will include discussion across the four organizational structures identified in this study.

Sample questions are shown in Table 1.2.

Table 1.2   Sample Interview Questions

Question Number	Question
1	Name your organizational title/position
2	Which of these five organizational structures characterizes your organization?
3	Characterize your relationship to each process step by one of the following: strong, moderate, weak, and none.

1.2.2   Use Case

The use case described in this section was used to frame the interview questionnaire to provide the data used in this study. The use case represents the decision model perspective guided the interviewees through their respective organizational decision making processes.

1.2.2.1   Use Case Description

The following case study describes an organizational problem:

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"A newly privatized national mail company needs to formulate strategies with a five-year planning horizon. To date the company has been protected by legislation, which allows it to operate as a monopoly on letter deliveries. This protection has engendered a culture of muddling through (i.e. minor adjustments to policies in reaction to events, with no clear sense of overall direction). However, the environment within which the company may operate in the future is likely to change fundamentally. For example, there is a possibility that it will lose its monopoly position, while technological developments pose long-term threats to the volume of letter mail. The company needs to plan its future strategy against this uncertain background. Diversification is one strategy that has been suggested (Goodwin, et al., page 425, 2014)."

1.2.2.2   Courses of Action

A course of action was developed for each of the five decision models associated with the use case in Section 1.2.2.1. This use case was decomposed into representative actions that embodied the decision making model steps in each decision making model presented in Section 1.1.2. These five courses of action were used to aid the interviewees when answering interview questions relating to the strength of their organization making the decision making model steps in each decision making model.

1.2.2.2.1   Normative Course of Action

The Normative course of action, associated with the use case in Section 1.2.2.1 and the Normative decision making model, described in Section 1.1.2.1 , is represented by the following steps in Table 1.3.

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Table 1.3   Use Case with Normative Course of Action

Step Number	Decision Model Step	Use Case Application
1	Structure the decision problem	Develop strategies with a five-year planning horizon allowing growth for newly privatized mail company.
1a	Generate proposed alternatives	Propose a specified number of strategies to support growth for the company during a five-year period.
1b	Specify objectives and attributes	Select an objective(s) for the company's strategies such as 25% growth in the company's business during the next five years. Select alternative attributes such as the level of diversification in the company's products.
2	Assess possible impacts of each alternative	Identify impacts of the proposed strategies on reaching the company's objectives.
2a	Determine magnitude and likelihood of impact on proposed alternatives	Based on an impact, what is the magnitude (e.g. in terms of severity - low, medium, high) and likelihood (e.g. in terms of occurrence - unlikely, likely, near certainty) on proposed strategies in reaching the company's objective(s)?
3	Determine preferences of decision making	What attributes of the proposed strategies are being used to determine the "best" strategy to realize the company's objective(s)?
3a	Structure and quantify values of decision makers	Structure the evaluation criteria of the strategy attributes and how the company's decision makers will evaluate these proposed strategies.
4	Evaluate and compare alternatives	Company decision makers will evaluate proposed strategies and compare these alternatives based on selected strategy attributes
4a	Evaluate proposed alternatives and conduct sensitivity analysis	Company decision makers will evaluate proposed strategies and conduct sensitivity analysis on proposed strategies and associated attributes to select the "best" strategy with a five-year horizon to reach the company's objective(s).

1.2.2.2.2   Descriptive Course of Action

The Descriptive course of action, associated with use case in Section 1.2.2.1 and the

Descriptive decision making model, described in Section 1.1.2.2, is represented by the following

steps in Table 1.4.

Table 1.4   Use Case with Descriptive Course of Action

Step Number	Decision Model Step	Use Case Application
1	Experience the Situation in a Changing Context	Due to the transition of the company, what is the future of this newly restructured company?
2	Perceived as typical	Is the selection of a planning strategy typical of this company?
3	Recognition	What are possible strategies?
3a	Expectancies	What are the expectations of this planning strategy?
3b	Relevant Cues	What are prompts to select a possible planning strategy?
3c	Plausible Goals	What are the outcomes of implementing a planning strategy?
3d	Typical Action	Select a planning strategy.
4	Evaluate Action	Evaluate the selected planning strategy.
5	Implement Course of Action	Implement the planning strategy.

1.2.2.2.3   Creative Course of Action

The Creative course of action, associated with use case in Section 1.2.2.1 and the

Creative decision making model, described in Section 1.1.2.3, is represented by the following

steps in Table 1.5.

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Table 1.5   Use Case with Creative Course of Action

Step Number	Decision Model Step	Use Case Application
1	Problem Recognition	Develop strategies with a five-year planning horizon allowing growth for newly privatized mail company.
2	Immersion	What could be possible strategies to support growth in the mail company? What criteria is important for the company to consider?
3	Incubation	Company sets aside the five year strategy planning. Executes immediate transition from government to privatize company.
4	Illumination	During the transition execution period, company realizes strategy to use for their five year planning.
5	Verification and Application	Company evaluates chosen strategy against identified criteria and starts implementing the strategy.

1.2.2.2.4   Evidence-Based Course of Action

The Evidence-Based course of action, associated with use case in Section 1.2.2.1and the

Evidence-Based decision making model, described in Section 1.1.2.4, is represented by the

following steps in Table 1.6.

Table 1.6   Use Case with Evidence-Based Course of Action

Step Number	Decision Model Step	Use Case Application
1	Identify the problem	Develop strategies with a five-year planning horizon allowing growth for newly privatized mail company.
2	Gather internal evidence and evaluate its relevance and validity	Gathers internal company data from previous years and determines if this data can be leveraged to support future planning.
3	Gather external evidence from published research	Gathers available data from other mail companies to support the evaluation of possible strategies.

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Table 1.6 (Continued)

4	Gather evidence from stakeholders affected by decision and consider implications	Gathers data from employees, board of directors and consider the impacts of possible strategies on these groups.
5	Integrate and appraise all data and make decision	Merges the data from the different sources and analyze this data against criteria to determine the five year planning strategy.

1.2.2.2.5　Rational Course of Action

The Rational course of action, associated with use case in Section 1.2.2.1 and the

Rational decision making model, described in Section 1.1.2.5, is represented by the following

steps in Table 1.7.

Table 1.7　Use Case with Rational Course of Action

Step Number	Decision Model Step	Use Case Application
1	Identify problem	Develop strategies with a five-year planning horizon allowing growth for newly privatized mail company.
2	Establish decision criteria	Select criteria for the company's strategies such as how much growth does the company want during the next five years.
3	Weigh decision criteria	Prioritize the selected decision criteria.
4	Generate alternatives	Generate a number of possible planning strategies.
5	Evaluate alternatives	Evaluate the proposed planning strategies against the decision criteria.
6	Choose best alternative	Select the alternative based on which one bests meets the prioritized decision criteria.
7	Implement decision	Execute planning strategy.
8	Evaluate decision	Evaluate strategy periodically to see if this strategy is meeting your criteria.

1.3　Results

This section utilizes descriptive statistics in Section 1.3.1 to frame the quantitative and

qualitative responses from the interview questions. Section 1.3.2 discusses the organizational

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structure mapping results based on the following mapping process. The decision making model-to-organizational structure mapping evaluation assessed the interview responses to establish relationship(s) between decision models and organizational structures. The mapping evaluation resulted in a relational matrix showing if a decision model attribute represents a step in how a certain organizational type makes a decision (e.g., if a functional organization uses an attribute of normative decision making to make an organizational decision). The relational matrix was used to perform similarity analysis between the decision models and organizational structures. This similarity analysis highlights commonalities and differences of organizational structures and what attributes of the decision models are being used to make organizational decisions. Based on the interview results, relationships were established for each decision model step against organizational structures, and these relationships are characterized as no relationship, weak relationship, moderate relationship, and strong relationship with a value of "0, 1, 3, and 9", respectively. From each interview, a similarity score was calculated for an organizational structure against a decision model to determine the overall strength of the relationship between an organizational structure and decision model. After determining the similarity scores between each decision model and organizational structure, the similarity score summary matrix was established with normalized scores. The maximum normalized score for a decision model is "9", due to the maximum individual decision making process model step being "9". Interviewees were asked which decision model holistically conformed to how their organizations made decisions. A hypothesis test procedure, Chi Square Test, was performed on this holistic decision model. The χ^2_{obs} value was compared to the χ^2_{exp} value. If the χ^2_{obs} value was greater than or equal to the χ^2_{exp} value, then the null hypothesis was rejected. If the χ^2_{obs} value was less than the χ^2_{exp} value, the null hypothesis could not be rejected. This analysis determined

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whether the experimental observed data was significantly different from the hypothesized expected data (Weaver et. al., 2017). Section 1.3.3 further discusses the overall impact of an organizational structure type on organizational decision making.

1.3.1   Organizational Structure Descriptive Statistics and Response Summaries

The organizational structure descriptive statistics include percent total of interviewees selected an organizational structure representing their organization and percent total of interviewees selected a decision model representing holistically how their organizations make decisions. Table 1.8 shows the organizational structures selected by the interviewees, though two interviewees selected two organizational structures that represented their organization. Thus, their responses are binned into each organizational structure identified in their response, and these two cases were identical by each interviewee stated their organization was representative of both functional and matrix organizational structures. All interviewees discussed their organization might be characterized by an organizational structure(s), though may have some attributes of another organizational structure. Ultimately, six interviewees selected the organizational structure that best characterized their organization. The other two interviewees determined their organizations were a hybrid of functional and matrix organizational structures, and their organizations were not primarily one of those two organizational structures.

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Table 1.8   Organizational Structures Interview Responses (n=8)

Organizational Structure	Percent Total
Matrix[1]	50%
Functional[1]	37.5%
Divisional	12.5%

Note: (1) Two interviewees selected both functional and matrix organizational structures in their responses, thus the response was split when calculating the percent total.

Interviewees did not select flat organizational structures as representative of their respective organizations, thus were not analyzed in this study.

Interviewee responses regarding the decision making model holistically representative of how their organizations make decisions based on their organizational structure are presented in Table 1.9. Across the five decision models, the Rational decision making model received the highest percentage of responses from the interviewed engineering or technical managers at 37.5%, and the Evidence-Based decision making model received the second highest percentage of interviewee responses at 25%. Generally, the interviewees gravitated towards the decision making model with the highest overall score based on their decision making model step responses. The interviewees reviewed "real-time" to determine which decision making model had the overall highest score, and in most cases, would select that decision making model. In addition, the representative holistic decision making model selection made by the interviewees could have been influenced by other organizational factors such as freedom to utilize a more personal decision making model or strict adherence to an prescribed organizational decision making model, and influence from other organizational members (such as direct supervisor) or organizational social networks.

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Table 1.9   Decision Making Models Interview Responses (n=8)

Decision Making Model	Percent Total
Normative	12.5%
Descriptive	12.5%
Creative	12.5%
Evidence-Based	25%
Rational	37.5%

Interviewee responses, showing the decision making model step(s) that their organizational strongly adheres to, are shown in Table 1.10. Three interviewees chose multiple decision making model steps with two interviewees selecting two decision making model steps and one interviewee selecting three decision making model steps. The other decision making model steps not listed in Table 1.10 received zero responses from the eight interviewees. Step 4, "Gather evidence from stakeholders affected by decision and consider implications", in the Evidence-Based decision making model received the highest number of responses from the interviewed engineering or technical managers at three. Step 4, "Generate alternatives", and Step 5, "Evaluate alternatives", in the Rational decision making model received the second highest number of responses at two. Across the five decision making models, half of the interviewees selected a decision making step associated with the Evidence-Based decision making model.

Based on their selection of the decision making model that their organization holistically adhered to (tied to organizational structure), only two interviewees selected a decision making model step not under the holistic decision making model they had selected. These two interviewees reviewed the decision making model steps across all decision making models, and

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chose the decision making model step that their organizational best adhered to. The other six

interviewees were immediately drawn to a decision making model step(s) associated with their

selected holistic decision making model.

Table 1.10   Decision Making Model Step Interview Responses

Decision Making Model	Decision Making Model Step	Number of Responses
Normative	Step 4	1
	Step 5	1
Evidence-Based	Step 2	1
	Step 4	3
	Step 5	1
Rational	Step 1	1
	Step 4	2
	Step 5	2

Note: (1) Eight Interviews were conducted. Three interviewees selected more than one decision
making process step.

Interview responses, showing the decision making model that is the least holistically

representative of how their organization make decisions, are presented in Table 1.11. Regarding

the least holistic representative decision making model, the Descriptive decision making model

received the highest percentage of responses from the interviewed engineering or technical

managers at 50%, and the Normative decision making model received the second highest

percentage of interviewee responses at 25%. Similar to how the selection was done for the

holistic decision making models, interviewees gravitated towards the decision making model

with the lowest overall score based on their decision making model step responses. The

interviewees reviewed "real-time" to determine which decision making model had the overall

lowest score, and in most cases, would select that decision making model.

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Table 1.11   Least Holistic Decision Making Model Interview Responses (n=8)

Decision Making Model	Percent Total
Normative	25%
Descriptive	50%
Creative	12.5%
Evidence-Based	12.5%
Rational	0%

1.3.2   Organizational Structure Mapping Results

Following the mapping process discussed in Section 1.3, the collected interview responses for each decision model and associated decision model steps are discussed throughout this section. The interviewees typically came to a definite response, in a timely manner, to characterize how well their organization adhere to a decision making model step, ranging from no relationship to a strong relationship. Interviewees were routinely resolute with their response regarding if their organization had a "no relationship" or "strong relationship" with a decision making model step. For their responses of "weak relationship" or "moderate relationship," the interviewees would leverage the appropriate decision making use case more to determine the relationship response for those decision making model steps, but would come to a definite response. The similarity scores associated with the interview responses, normalized based on the process discussed in Section 1.3, are shown in Table 1.12. The maximum normalized score is "9" for each decision model.

Table 1.12   Normalized Similarity Scores associated with Decision Models

Decision Making Models	Normalized Similarity Scores – Per Participant							
	1	2	3	4	5	6	7	8
Normative	9.00	4.88	7.50	7.13	5.25	4.88	6.00	6.75
Descriptive	9.00	6.00	7.00	5.33	7.00	7.33	7.00	7.33
Creative	9.00	6.00	8.40	7.20	7.20	6.00	6.60	8.40
Evidence-Based	9.00	6.60	7.20	4.80	6.00	6.60	5.40	7.20
Rational	9.00	6.38	8.25	6.75	6.00	7.50	4.13	9.00

The normalized similarity decision making model scores were subsequently binned according to the organizational structure associated with the interviewees. Based on the number of interviewees that selected a type of organizational structure, a mean was calculated for the associated responses. (Example: four interviewees selected a matrix organizational structure, thus the mean and was calculated for those four normalized scores). Table 1.13 shows the mean normalized similarity score for each decision making model and organizational structure. This table also shows the total normalized scores associated with each decision making model and organizational structure. The decision making models had total normalized similarity scores ranging from 18.64 to 22.05 (maximum total score – 27.00) across the three organizational structures associated with the technical or engineering manager interviewees. These total similarity scores for the five decision making models only represented a range from 69 percent to 82 percent fit with the maximum total normalized similarity score. These relatively low percent fit values for the five decision making models show that another decision making model can be developed to better represent how an organization makes decisions.

Table 1.13   Mean Normalized Similarity Scores

Decision Making Models	Organizational Structure			Total Scores	Maximum Total Score
	Matrix	Functional	Divisional		
Normative	7.44	5.95	5.25	18.64	
Descriptive	7.17	6.88	7.00	21.05	
Creative	7.80	7.05	7.20	22.05	27.00
Evidence-Based	6.90	6.53	6.00	19.43	
Rational	7.88	6.84	6.00	20.72	

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Based on the information from Table 1.13, the mean of 20.38 and variance of 1.82 was calculated for the total normalized scores across each decision model. Based on a low variance from these eight interviewees, a similar low variance would be anticipated if additional engineering or technical manager participants were added to a future study based on this research.

The interviewees were asked which decision model holistically best-fits how their organization makes decisions. Table 1.14 merges the responses from Table 1.8 and Table 1.9 to develop a table that represents a crosswalk between the five decision making models and three organizational structures.

Table 1.14   Holistic Best-Fit Decision Making Model Based on Organizational Structure

Decision Making Models	Organizational Structure		
	Matrix	Functional	Divisional
Normative (n=1)	50%	50%	0%
Descriptive (n=1)	0%	100%	0%
Creative (n=1)	0%	0%	100%
Evidence-Based (n=2)	50%	50%	0%
Rational (n=3)	50%	50%	0%

Note: (1) Normative and Rational Decision Models included interviewees that selected both Matrix and Functional Organizational Structures.

The chi square results ($\chi2(8$, n=8) = 9.00, p =0.342) conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "decision making model will not show a preference to a certain organizational structure or decision type", could not be rejected. Realizing the small sample size and several "decision making model-organizational structure" bins represented by zero responses, Table 1.14 shows how seven out of the eight interviewees that associated with four of the five decision making models were aligned with either a matrix or functional organizational structure.

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1.3.3   Organizational Structure Impact

Decision making is a complex process regardless of the type of organizational structure, which matrix, functional, and divisional organizational structure types were included in this study. Multiple decision making models exist, though this study focused on five decision making models, which included Normative, Descriptive, Creative, Evidence-Based, and Rational. Discussing the results shown in Section 1.3.1 and Section 1.3.2, the organizational structure impact will be comprised of influences from decision making considerations, similarity scores, and best fit decision model. This section will build to the study's objective, as discussed in Section 1.1.1, an organizational decision model framework coupled to influences from the three organizational structures.

1.3.3.1   Decision Making Consideration Impacts

All five decision making models contain aspects of the four decision making considerations, discussed in Section 1.1.2 and shown in Table 1.15.

Table 1.15   Decision Making Considerations (March, 1991)

Term	Definition
Alternatives	An organization has multiple courses of action to select from
Consequences	An organization understands the consequences associated with the different courses of action
Consistent Preference Ordering	An organization has a consistent means to compare courses of action
Decision Rule	An organization has rules to decide on a single course of action based on the consequences and preferences of all potential courses of action

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As the decision making models are further broken down into their individual steps, a high degree of similarity exists between different decision models at this individual decision making step level. An example is the Normative and Rational decision making models include steps that state some form of: "generate alternatives." Furthermore, this example highlights the connection of these five decision making models to the decision making considerations, listed in Table 1.15, and for this example in particular, the first decision making consideration: "Alternatives." Table 1.16 further illustrates the similarity of decision making model steps across the five decision making models tied to the four decision making considerations.

Table 1.16   Decision Making Considerations – Decision Model Steps Relational Information

Term	Decision Making Model Steps[1]
Alternatives	Normative Step 1a, Step 1b
	Descriptive Step 1, Step 2
	Rational Step 4
Consequences	Normative Step 2
	Descriptive Step 3a
	Evidence-Based Step 2, Step 3, Step 4
	Rational Step 5
Consistent Preference Ordering	Normative Step 2a, Step 3, Step 3a
	Descriptive 3c
	Evidence-Based Step 2, Step 3, Step 4
	Rational Step 5
Decision Rule	Normative Step 4, Step 4a
	Descriptive Step 4
	Creative Step 5
	Evidence-Based Step 5
	Rational Step 6

Note:(1) Reference APPENDIX A to correlate decision making step number to decision making model step definition

Continuing with the impact of decision making considerations related to decision making models, Step 4, "Gather evidence from stakeholders affected by decision and consider implications", in the Evidence-Based decision model, highlighted in Table 1.10, received the

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highest number of interviewee responses. This Evidence-Based decision making model step relates to the "Consequences" decision making consideration from Table 1.15 and Table 1.16. As these decision making steps in the five decision making models are aggregated back into their respective "holistic" decision making models, this study investigated the intersection of the five decision making models against the three organizational structure types, discussed further in the next section.

1.3.3.2   Similarity Score Impact

From the mean normalized similarity scores listed in Table 1.13, the Normative, Creative, Evidence-Based, and Rational decision making models were shown to have the strongest relationship with the Matrix organizational structure. The Descriptive decision making model showed similar strength of relationships across the three organizational structures. Even with the similar strength of relationships across the three organizational structures, the Descriptive decision model also revealed to have the strongest relationship with the Matrix organizational structure. Thus, these similarity scores revealed the Matrix organizational structure as having the strongest relationship regardless of decision making model. Furthermore, these similarity scores form the foundation that an organizational structure does not adhere to a certain decision making model (represented by the five decision making models comprising this study).

In addition, the Creative decision making model had the strongest relationship across the three organizational structures (scored at 22.05), though this score only represented an 82 percent fit to the maximum total similarity score (scored at 27). In addition, the variance between the total similarity scores was 1.82 with the mean at 20.38. With the mean of the total similarity scores and the relatively small variance, these statistics served as another illustration that an organizational structure does not adhere to one of these five decision making models.

Between the best fit of a decision making model at only 82 percent and the mean fit across all five decision making models only at 75 percent, these fit values expose that decision making step(s) are missing from these five decision making models. None of these decision making models best represents how an organization, regardless of organizational structure, makes a decision. This lends to developing a decision making model that will be representative to how an organization regardless of organizational structure makes a decision.

1.3.3.3   Best Fit Decision Model Impact

Expanding the analysis on the five decision models "holistically", Table 1.14 allowed the determination that the null hypothesis, "decision model will not show a preference to a certain organizational structure or decision type", could not be rejected. With being unable to reject this null hypothesis, this showed as an example that a particular organizational structure (such as matrix) could not be affiliated with one of the five decision making models (such as Normative). Further summarized as an organization, regardless of structure type, does not adhere to one of the these five decision making models.

1.3.4   Organizational Decision Making Model (Organizational Structure)

Throughout this study, the relationship between five decision making models and three organizational structures has been investigated. This study has been examining that relationship through this question, "did a certain type of organizational structure(s) adhere to a particular decision making model?," to assist in the determination of an organizational decision making model. Throughout this decision making model-organizational structure relational analysis discussed in Section 1.3, the results have shown a certain type of organizational structure does not adhere to a particular decision making model. From this inference, a decision

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making model can be developed representative of common themes between the five decision making models. In addition, this organizational decision making model can use the decision making considerations, discussed in Section 1.1.2 and Section 1.3.3.1, as a means to educed those common themes between the five decision making models. These common themes across the five decision making models are generalized to develop decision making model steps for this organizational decision making model (organizational structure). This decision making model ties together the start and end of the decision making process, represented by "identify the problem" and "choose a course of action", respectively, and the four decision making considerations from Table 1.15 to develop the resulting organizational decision making model, regardless of organizational structure type, shown in Table 1.17. This organizational decision making model represents how engineering or technical managers within the organization would make decisions.

Expanding on the organizational decision making model outlined in Table 1.17, the first decision making model step, "Identify and structure the problem," emphasizes that an organization should initially address a problem facing the organization; Study 2 discusses types of problems (decisions) confronting organizations. The first step also comprises the concept that an organization needs to arrange the problem in a form that alternatives (courses of actions) could be generated. Furthermore, this first decision making model step is a hybrid based on the first decision making step across the decision making models, excluding the Descriptive decision making model. These four decision making models use some form of identifying the problem as their first decision making step.

The second decision making model step, "Generate possible alternatives," codifies the knowledge associated with the problem into courses of actions that the organization could use to

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resolve the problem. This study does not address the "optimal" number of courses of action that an organization should generate, though a number of alternatives greater than one should be generated to productively continue through this model. This second decision making model step is a hybrid based on the "Generate alternatives" decision making model step from the Rational decision making model, and "Generate proposed alternatives" decision making model step from the Normative decision making model.

The third decision making model step, "Determine impact of alternatives," focuses on an organization understanding the consequences associated with the respective alternatives. An organization in comprehending the impact of the respective alternatives should include a time component ranging from real-time (e.g., immediate) to long term (e.g., several years). This third decision making model step is a hybrid step based on the "Assess possible impacts of each alternative" decision making model step from the Normative decision making model, and the three gathering evidence decision making model steps from the Evidence-Based decision making model.

The fourth decision making model step, "Identify evaluation criteria for alternatives," builds on the identified alternative impacts from the third step, and conveys that an organization specifies a consistent approach to assess the respective alternatives. This fourth decision making step is a hybrid step based on the two decision criteria decision making model steps from the Rational decision making model, three decision criteria decision making model steps from the Normative decision making model, and the three gathering evidence decision making model steps from the Evidence-based decision making model.

The fifth decision making model step, "Evaluate possible alternatives", imparts that an organization utilizes the evaluation approach, determined in the fourth step, to assess the

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respective alternatives. This fifth decision making model step is a hybrid step based on "Evaluate action" decision making step from the Descriptive decision making model, "Evaluate and compare alternatives" decision making step from the Normative decision making model, and "Evaluate alternatives" decision making step from the Rational decision making model.

The sixth decision making step, "Choose defensible alternative," expresses that an organization determine the course of action that the organization will implement to resolve the problem. This sixth step is a hybrid step based on implement decision or choose course of action decision making model steps across the five decision making models. The word "defensible" was chosen over the word "best" or similar word in describing the selected alternative because the selected alternative should be defensible through the traceability from the selected alternative through the evaluation criteria, ultimately back to identifying and structuring the problem. The "best" alternative should be defensible, however other alternatives could be defensible too, thus could be an alternative that could be selected to resolve the problem.

This organizational decision making model does not include a step associated with evaluating the decision after the decision has been made to select a defensible alternative. The previous statement focuses on that this is a decision making model for an organization to follow steps from identifying the problem that needs to be resolved to choosing a defensible alternative to implement. Any "post-decision" actions are important for an organization to periodically evaluate their decisions, but beyond the focus of this organizational decision making model.

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Table 1.17   Organizational Decision Making Model

Model Step Number	Model Step Title
1	Identify and structure the problem
2	Generate possible alternatives
3	Determine impact of alternatives
4	Identify evaluation criteria for alternatives
5	Evaluate possible alternatives
6	Choose defensible alternative

This study's organizational decision making model, presented in Table 1.17, has characteristics of the modern organizational theory model (discussed in Section 1.1.2), reshown with its three steps: 1) Decision maker considers only two or three alternatives, 2) Decision makers adopts an alternative if it satisfies certain criteria, and 3) If the alternatives fail to satisfy the criteria, the decision maker explores additional alternatives. This study did show; regardless of organizational structure, a representative organizational decision making model could be established, and this study's organizational decision making model had principles similar to the modern organizational theory model that "a" decision making model could represent how organizations make decisions. These two decision making models illustrated decision making steps that included generating alternatives, establishing evaluation criteria for these alternatives, and making a decision tied to the decision criteria. However, this study's organizational decision making model delineates additional decision making model steps to understand the consequences of the alternative earlier in the decision making process using that information to establish evaluation criteria, and ultimately leading to a chosen defensible alternative. In addition, this study's did not specify a number of alternatives that needed to be generated for evaluation, and

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additional research can be conducted to determine an "optimal" number of alternatives, which potentially is not two or three alternatives. Lastly, this study's organizational decision making model did not include any "post-decision" actions, though those actions are important to periodically evaluate the decision, but beyond the focus of an organization choosing their defensible alternative.

1.4   Conclusion

Through the exploration of five decision making models and three organizational structure types, discussed in Section 1.1.2 and Section 1.1.3, respectively, interviews of engineering or technical managers allowed the investigation of relationships between decision making models and organizational structures. The similarity relationships between decision making models and organizational structures were determined and analyzed to see if a certain type of organizational structure adheres to a particular decision making model. The results from determining similarity relationships showed an organizational structure does not adhere to one of these five decision making models. Furthermore, these results allowed the formation of an organizational decision making model described in Section 1.3.4. This study's organizational decision making model aligns with characteristics from the modern organizational theory model. This decision model forms one vantage of an organizational decision making model as this model builds on the exploration of five decision models and three types of decisions, and the investigation of how social networks impact organizational decision making, examined in Study 2 and Study 3, respectively.

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1.4.1 Future Work

Future work in researching organizational decision making could involve determining the fit of the organizational decision making model shown in Table 1.17 to how organizations make decisions. The research would evaluate if this organizational decision making model would better fit how an organization, regardless of structure, would make decisions. In addition, this evaluation could also investigate the "optimal" number of alternatives that an organization should generate in their decision making. Ultimately, this research would attempt to validate the organizational decision making model developed in this study compared to the other five decision making models researched.

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CHAPTER II

DECISION TYPES AND DECISION MODELS EVALUATION

2.1 Introduction

Decision making can be classified into three decision types: strategic, tactical, and operational. These types of decisions can be made throughout the organization ranging from an executive board to operating floor managers. Looking at the interdependencies within an organization, an executive board making a strategic decision for an organization will influence the tactical and operational decisions being made throughout the organization. Based on an organization's decision type, does an organization adhere to a specific decision making model in determining a course of action to solve the organizational problem?

2.1.1 Study Objective

This study's objective is to understand the relationship between decision making models and decision types. This study will utilize a use case to support an interview questionnaire to collect data to understand the strength of the relationship between a decision type and the decision models. The outcome of this study will be the determination of the decision making model that is used to make a certain decision type, and the continued development of an organizational decision making model framework.

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2.1.2   Existing Decision Making Models

Decision models are comprised of varying number of steps generally ranging from a first step of "defining a problem" to a last step of "selecting a course of action." These decision model steps can be characterized by decision making considerations shown in Table 2.1.

Table 2.1   Decision Making Considerations (March, 1991)

Term	Definition
Alternatives	An organization has multiple courses of action to select from
Consequences	An organization understands the consequences associated with the different courses of action
Consistent Preference Ordering	An organization has a consistent means to compare courses of action
Decision Rule	An organization has rules to decide on a single course of action based on the consequences and preferences of all potential courses of action

These decision making considerations are similar for either an individual or an organization, since either investigates possible alternatives and consequences of those alternatives during their decision making process.

Looking beyond the individual decision making process, is there a representative model to how an organization makes a decision? Previous research includes describing an organizational decision making process in three ways through the lens of the October 1962 Cuban Missile Crisis: Rational actor model, organizational process model, and government politics model. The Rational actor model was built on the assumption each organization (e.g. U.S. and USSR governments) was making decisions based as rational decision makers. The organizational process model was built on the premise that organizations make decisions based on their organizational routine. This organizational routine is represented by the "standard" practices of the organization. The government politics model viewed decision making as a

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"bargaining game" among organizational leaders involved in the decision making process (Allison, 1971) (Kuwashima, 2014).

Other organizational decision making process research leads to decision theory and decision making going through these three steps: 1) Decision makers find available alternative plans, 2) Decision makers predict consequences of choosing alternatives, and 3) Decision makers choose an alternative based on preference. These three steps were modified into the modern organizational theory model represented by these three steps: 1) Decision maker considers only two or three alternatives, 2) Decision makers adopts an alternative if it satisfies certain criteria, and 3) If the alternatives fail to satisfy the criteria, the decision maker explores additional alternatives. This model represents a possible "optimal" decision making model that could be representative to how an organization makes a decision (Lynn, 1982) (Kuwashima, 2014).

These decision making models represent different processes for how an organization could make a decision. A question to be asked: is there a different model depending on the organizational perspective or is there an optimal model to represent the organizational decision making process (Kuwashima, 2014)?

This study builds on the last question from the previous paragraph through the determination if an organization adheres to a specific decision making model in selecting a course of action to solve the organizational problem based on the decision type (focused on engineering or technical managers)? This study reviews five decision making models, representative of an individual's decision making process, to determine if one of these decision making models could be representative of how an organization, focusing on the decision type, makes a decision. The five decision making models researched to support the development of an

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organizational decision making model include Normative, Descriptive, Creative, Evidence-Based, and Rational. Examples representing general situations that these decision making models are used include: Creative – courses of action to solve the problem are not clear, and Rational – information on the courses of actions can be gathered and quantified (Erdogan, et al., 2010).

2.1.2.1   Normative

Normative decision making is coupled with mathematical models allowing the evaluation of decision judgements against standards (Baron, 2004). Normative decision making models (including utility theory) are assessed by their theoretical accuracy, defined as the model's capability to provide acceptable idealizations (Bell et. al., 1988). An example of a Normative decision making model is shown in Figure A.1.

2.1.2.2   Descriptive

Descriptive decision making can also be coupled with mathematical modeling, which concentrates on how and why individuals think and act. A common definition of descriptive decision making model is an abstraction asserting to describe an individual's behavior (Bell et. al., 1988). One well-researched area of descriptive decision making is naturalistic decision making, expressed as the study of how experienced individuals or groups work in dynamic and uncertain environments, and assess the situation, make decisions, and take actions (Zsambok et al., 2014). The Recognition-primed decision making model represents a primary naturalistic decision making model example, shown in Figure A.2. This decision making model will be used as the representative decision making model for Descriptive decision making in this study.

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2.1.2.3   Creative

Creative decision making is focused around individuals or groups generating new, imaginative ideas. A creativity decision making model is shown in Figure A.3. Three factors are considered in evaluating the Creative decision making model. The first factor is fluency; defined as the number of ideas an individual is able to generate. The second factor is flexibility; defined as how different the ideas are from one another. An example: if an individual is able to generate numerous distinctive courses of actions that can be used to solve the identified problem, that process following the Creative decision making model is considered to have high flexibility. The third factor is originality; defined as how unique an individual's ideas are (Erdogan, et al., 2010).

2.1.2.4   Evidence-Based

Evidence-based decision making represents a process when an individual or group conscientiously uses the best available data and evidence when making decisions. A five-step evidence-based decision making model, shown in Figure A.4, begins with a decision maker gathering internal and external evidence about the identified problem. This gathered information is subsequently integrated with stakeholder information, implications about the possible decision are considered, and ultimately a decision is made (Kreitner et al., 2012).

2.1.2.5   Rational

Rational decision making represents when a decision maker is choosing among alternatives in a way aligning with their preferences. Furthermore, Rational decision making involves unanalyzed alternatives and associated preferences reflecting the desirability of an alternative and the rationality criteria, such as maximum desirability of a selected alternative

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with respect to a preference ranking (Doyle, 1997). A Rational decision making model is shown in Figure A.5.

2.1.3   Decision Types

The decision structure and information characteristics will change depending on the decision type, shown in Figure 2.1. Operational decisions are generally more structured by these decisions focus on courses of action that have procedures that can be followed and are defined in advance. An example of a structured operational decision is an organization needs to reorder inventory of items that the organization regularly consume. Strategic decisions are generally unstructured by these decisions focus on courses of action that it is not possible to define decision procedures in advance. An example of an unstructured strategic decision is an organization needs to determine a long-term initiative about a new possible organizational capability. Tactical decisions are between strategic and operational decisions and characterized as semi-structured. An example of a semi-structured tactical decision is appraising employee performance (O'Brien et. al., 2011).
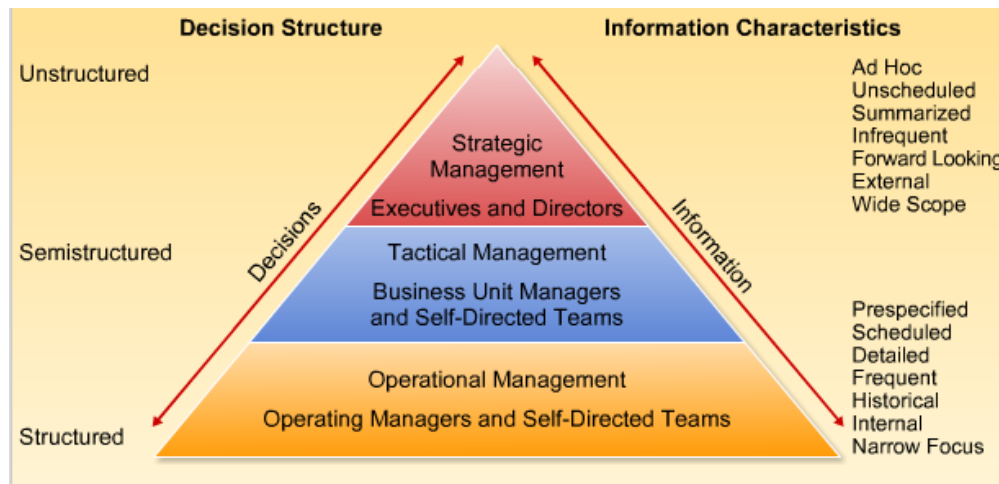
Figure 2.1   Decision Making Types (O'Brien et. al., 2011)

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2.1.3.1 Strategic

Strategic decisions can be framed by having an impact on an organization's direction and scope over a long period to achieve a potential advantage in a changing environment through the management of resources and competences to satisfy stakeholder expectations. Based on the previous statement, strategic decisions can be broken down into several attributes including:

- Long term organizational direction: Impact of decision will be measured over a "marathon and not a sprint."

- Organizational scope: what is the focus of the organization? Does the organization focus on one activity or several activities?

- Organizational advantage: What potential advantage does the organization have over similar types of organizations?

- Strategic fit within environment: Does the organization provide products or services, which clearly meet identified "market" needs?

- Organizational resources and competences: Can an organization leverage its resources and competences to provide an advantage or produce new opportunities?

- Organizational leaders' values and expectations: Leaders drive the direction of the organization through determining the fundamental issues the organization focuses on (Johnson et. al., 2008).

Beyond the strategic decision attributes, strategic decisions involve developing a knowledge repository to aid organizational decision makers to see threats and opportunities sooner and more accurately. In addition, strategic decisions should allow stimulation of quick conflict to improve the quality of "brainstorming" without sacrificing significant time. Strategic

decisions also should be crafted with a disciplined pace to allow conclusion of the decision making process in a timely manner, and should be shaped in a defusing political environment to avoid unproductive conflict (Eisenhardt, 1999).

2.1.3.2   Tactical

Tactical decisions are impacted by the outcomes from the organization's strategic decisions with characteristics such as a medium term time scale and organizational scope. In addition, "middle management," such as an organizational unit head, makes these decisions (Ghuman, 2010). These decisions should involve the needs and activities of a specific organizational unit (e.g. a division within a larger organization), and how this organizational unit supports the broader strategic goals of the entire organization. Tactical decisions support three functional purposes including: 1) Assists the organizational unit in supporting the entire organization's strategic goals/guidance; 2) Sets the key priorities of the organizational unit and establishes the organizational unit's goals; and 3) Establishes the specific objectives with measurable results to satisfy this organizational unit's goals. Tactical decisions allow the organizational unit to set their needs (based on strategic guidance) over a medium time scale (example: 2-4 years), ensuring the annual activities are aligned with future goals and events (University of Scranton, 2009).

2.1.3.3   Operational

Operational decisions are impacted by the outcomes from the organization's strategic and tactical decisions (Misni et. al., 2017). Operational decisions are generally more structured by these decisions focus on courses of action that have procedures that can be followed and are defined in advance (O'Brien et. al., 2011). Operational decisions can be broken down into

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several characteristics including: 1) Short term organization direction: impact of decision will be a short time scale such as daily activities; 2) Organizational resources: small scale impact on the organizational resources affected by this decision type; and 3) Established organizational scope: activities associated with this decision type will be repetitive, and will generally have established objectives based on the organizational strategic and tactical decisions (Lucey, 2005).

2.1.4   Decision Types Examples and Use Cases

Table 2.2 shows examples from the three decision types that could be made throughout an organization.

Table 2.2   Decision Type Examples (University of Minnesota, 2015)

Strategic Decisions	Should we merge with another company?
	Should we pursue a new product line?
	Should we restructure the organization?
Tactical Decisions	What should we do to help facilitate employees from the two groups working together?
	How should we market the new product line?
	Who should we hire or "let go" if we restructure the organization?
Operational Decisions	How often should I communicate with my new team members?
	What should I say to customers about our new product?
	How do I balance my demands between projects?

Building on the examples from the previous table, Table 2.3 shows examples of the three decision types examples tied to an organization responsible for supply chain management.

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Table 2.3   Decision Type Examples associated with Supply Chains (Misni et. al., 2017)

Decision	Strategic	Tactical	Operational
Location of distribution and manufacturing facilities	X	X	
Vehicle routing with simultaneous delivery and pick-up			X
Location of plant and distribution warehouse	X		
Production and inventory for safety stock planning		X	
Number of locations for storage and treatment facilities	X		
Time-varying collection and treatment amount of hazardous waste		X	
Optimal price and return policies	X		
Optimal flow of products between facilities	X		
Service area establishment for each depot		X	X
Optimal number of manufacturing and remanufacturing product per period		X	
Location and flow allocation of products for each facilities integrated with queuing relationship	X	X	

2.2   Methods

This section will discuss the data collection method, a use case to support the data collection method, and the evaluation method to understand the relationship between decision types and decision models.

2.2.1   Interview Questionnaire

The interview questionnaire, shown in APPENDIX B, was used as the data collection method to support the evaluation between decision types and decision models. Interviewees were selected based on being an engineering or technical manager and making at least one of the decision types discussed in Section 2.1.3. Eight interviews were conducted with each interviewee was asked the interview questions for this study. The eight interviews were associated with the following decision types shown in Table 2.5.

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Mississippi State University IRB reviewed this interview questionnaire with study number IRB-18-390, "Developing an Organizational Decision Making Model." The Mississippi State University IRB determined IRB approval was not required for this interview questionnaire.

The interviewees were provided a read-ahead presentation, shown in APPENDIX C, which included material about the five decision models, four organizational structures, and the use case described in Section 2.2.2. Sample questions are shown in Table 2.4.

Table 2.4   Sample Interview Questions

Question Number	Question
1	Name your organizational title/position
2	Which of these five organizational structures characterizes your organization?
3	What type of decision(s) do you make in your position?
3a	What is your primary decision type for your position?
4	Characterize your relationship to each process step by one of the following: strong, moderate, weak, and none.

2.2.2   Use Case

The use case described in this section was used to frame the interview questionnaire to provide the data used in this study. The use case represents the decision model perspective and guided the interviewees through the type(s) of decisions made by the interviewees.

2.2.2.1   Use Case Description

The following case study describes an organizational problem:

"A newly privatized national mail company needs to formulate strategies with a five year planning horizon. To date the company has been protected by legislation which allows it to operate as a monopoly on letter deliveries. This protection has engendered a culture of

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muddling through (i.e. minor adjustments to policies in reaction to events, with no clear sense of overall direction). However, the environment within which the company may operate in the future us likely to change fundamentally. For example, there is a possibility that it will lose its monopoly position, while technological developments pose long-term threats to the volume of letter mail. The company needs to plan its future strategy against this uncertain background. Diversification is one strategy that has been suggested (Goodwin, et al., page 425, 2014)."

2.2.2.2   Course of Action Descriptions

A course of action was developed for each of the five decision models associated with the use case in Section 2.2.2.1. This use case was decomposed into representative actions that embodied the decision making model steps in each decision making model presented in Section 2.1.2. These five courses of action were used to aid the interviewees when answering interview questions relating to the strength of their organization making the decision making model steps in each decision making model.

2.3   Results

This section reports the descriptive statistics in Section 2.3.1 to frame the quantitative and qualitative responses from the interview questions. Section 2.3.2 discusses the organizational structure mapping results based on the following mapping process. The decision making model-to-decision type mapping evaluation assessed the interview responses to establish relationship(s) between decision models and decision types. The mapping evaluation resulted in a relational matrix showing if a decision model attribute represents a step in how a certain organizational type makes a decision (e.g., if an organization uses an attribute of Rational decision making to

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make an strategic decision type). The relational matrix was used to perform similarity analysis between the decision models and decision types. This similarity analysis highlights commonalities and differences of decision types and what attributes of the decision models are being used to make organizational decisions. Based on the interview results, relationships were established for each decision model step against decision type, and these relationships are characterized as no relationship, weak relationship, moderate relationship, and strong relationship with a value of "0, 1, 3, and 9", respectively. From each interview, a similarity score was calculated for a decision type against a decision model to determine the overall strength of the relationship between a decision type and decision model. After determining the similarity scores between each decision model and decision type, the similarity score summary matrix was established with normalized scores. The maximum normalized score for a decision model is "9", due to the maximum individual decision making process model step being "9". Interviewees were asked which decision model holistically conformed to how their organizations made decisions. A hypothesis test procedure, Chi Square Test, was performed on this holistic decision model. The $\chi2obs$ value was compared to the $\chi2exp$ value. If the $\chi2obs$ value was greater than or equal to the $\chi2exp$ value, then the null hypothesis was rejected. If the $\chi2obs$ value was less than the $\chi2exp$ value, the null hypothesis could not be rejected. This analysis determined whether the experimental observed data was significantly different from the hypothesized expected data (Weaver et. al., 2017). Section 0 further discusses the overall impact of a decision type on organizational decision making.

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2.3.1 Decision Type Descriptive Statistics and Response Summaries

The decision type descriptive statistics include percent total of interviewees selected any decision type they make in their organization and selected the decision type that they primarily make in their organization and percent total of interviewees selected a decision model representing holistically how their organizations make decisions. Table 2.5 shows any decision type selected by the interviewees, though every interviewee expect one selected multiple decision types that they make in their organization. Thus, their responses were binned into each decision type identified during their interviews. Interviewees that selected strategic decision type were deemed to make strategic decisions, not just provide input for other organizational member(s) to make strategic decisions.

Table 2.5   Interviewees Associated with Decision Type(s) (n=8)

Decision Type	Percent Total
Strategic	87.5%
Tactical	75%
Operational	75%

All interviewees that responded with making multiple decision types in their organizational role identified with a more structured decision (e.g., operational or tactical) as their primary decision type. Table 2.6 shows the primary decision type selected by the interviewees, though one interviewee selected two primary decision types that they make in their organization. Thus, their response was binned into each decision type identified during their interview. Based on Table 2.6, engineering or technical managers aligned their primary decision type as Tactical. This selection of the Tactical decision type aligns with the information

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presented in Figure 2.1 by this figure presented Tactical decisions as the primary type of decision

for organizational members compared to technical or engineering managers.

Table 2.6   Interviewees Associated with a Primary Decision Type(s) (n=8)

Decision Type	Percent Total
Strategic[1]	6%
Tactical[1]	56%
Operational	38%

Notes:(1) One interviewee selected both tactical and strategic in their response, thus the response was split when calculating the percent total.

Interviewee responses regarding the decision making model holistically representative of

how their organizations make decisions are presented in Table 2.7. Across the five decision

making models, the Evidence-Based decision making model received the highest percentage of

responses from the interviewed engineering or technical managers at 50%, and the Descriptive

and Rational decision making models received the second highest percentage of interviewee

responses at 25%.   Generally, the interviewees gravitated towards the decision making model

with the highest overall score based on their decision making model step responses. The

interviewees reviewed "real-time" to determine which decision making model had the overall

highest score, and in most cases would select that decision making model.

Table 2.7   Decision Making Model Responses (n=8)

Decision Model	Percent Total
Normative	0%
Descriptive	25%
Creative	0%
Evidence Based	50%
Rational	25%

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Interviewee responses, showing the decision making model step(s) that their organizational strongly adheres to based on primary decision type, are shown in Table 2.8. Four interviewees chose multiple decision making model steps with one interviewee selecting six decision making model steps, one interviewee selecting three decision making model steps, and two interviewees selecting two decision making model steps. The other decision making model steps not listed in Table 2.8 received zero responses from the eight interviewees. Step 2, "Gather internal evidence and evaluate its relevance and validity", in the Evidence-Based decision making model and Step 4,"Generate alternatives" in the Rational decision making model received the highest number of responses from the interviewed engineering or technical managers at 3. Step 4, "Gather evidence from stakeholders affected by decision and consider implications", in the Evidence-Based decision making model, and Step 1, "Identify problem", and Step 5, "Evaluate alternatives", in the Rational decision making model received the second highest number of responses at 2. Across the five decision making models, half of the interviewees selected a decision making step associated with the Evidence-Based decision making model.

Based on their selection of the decision making model that their organization holistically adhered to (tied to primary decision type), only one interviewee selected a decision making model step not under the holistic decision making model they had selected. This one interviewee reviewed the decision making model steps across all decision making models, and chose the decision making model step that their organizational best adhered to. The other seven interviewees were immediately drawn to a decision making model step(s) associated with their selected holistic decision making model

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Table 2.8   Decision Making Process Step Interview Responses

Decision Model	Decision Model Step	Number of Responses
Normative	Step 1	1
Evidence-Based	Step 2	3
	Step 3	1
	Step 4	2
Rational	Step 1	2
	Step 2	1
	Step 3	1
	Step 4	3
	Step 5	2
	Step 6	1

Note: (1) Eight Interviews were conducted. Four interviewees selected more than one decision making process step.

   Interview responses, showing the decision making model that is the least holistically representative of how their organization makes decisions (associated with specific decision type(s), are presented in Table 2.9. Regarding the least holistic representative decision model, the Descriptive decision making model received the highest percentage of responses from the interviewed engineering or technical managers at 37.5%, and the Normative and Creative decision making models received the second highest percentage of interviewee responses at 25%. Similar to how the selection was done for the holistic decision making models, interviewees gravitated towards the decision making model with the lowest overall score based on their decision making model step responses. The interviewees reviewed "real-time" to determine which decision making model had the overall lowest score, and in most cases would select that decision making model.

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Table 2.9   Least Holistic Decision Model Interview Responses (n=8)

Decision Model	Percent Total
Normative	25%
Descriptive	37.5%
Creative	25%
Evidence-Based	12.5%
Rational	0%

2.3.2   Decision Type Mapping Results

Following the mapping process discussed in Section 2.3, the collected interview

responses for each decision model and associated decision model steps are discussed throughout

this section. The similarity scores associated with the interview responses, normalized based on

the process discussed in Section 2.3, are shown in Table 2.10. Interviewees were routinely

resolute with their response regarding if their organization had a "no relationship" or "strong

relationship" with a decision making model step. For their responses of "weak relationship" or

"moderate relationship," the interviewees would leverage the appropriate decision making use

case more to determine the relationship response between their primary decision type and those

decision making model steps, but would come to a definite response. The maximum normalized

score is "9" for each decision model.

Table 2.10   Normalized Similarity Scores associated with Decision Models

Decision Making Models	Normalized Similarity Scores – Per Participant							
	1	2	3	4	5	6	7	8
Normative	9.00	5.25	8.25	7.50	6.38	6.75	6.38	7.13
Descriptive	9.00	6.00	7.33	6.00	6.00	7.33	8.00	8.33
Creative	9.00	6.00	9.00	7.20	6.00	6.60	4.80	9.00
Evidence-Based	9.00	6.60	8.40	6.60	6.60	8.40	7.80	7.20
Rational	9.00	6.38	9.00	7.50	9.00	7.88	5.25	9.00

The normalized similarity decision making model scores were subsequently binned according to any decision type made by interviewee and the primary decision type made by the interviewee. Based on the number of interviewees that selected a type of decision, a mean was calculated for the associated responses. (Example: four interviewees selected a strategic decision type, thus a weighted mean was calculated for those four normalized scores). Table 2.11 shows the mean normalized similarity score for each decision making model and any decision type made by an interviewee. This table also shows the total normalized scores associated with each decision model and decision type. The Rational decision making model had the highest total normalized score at 23.62 (maximum total score – 27.00) across the three decision types associated with the technical or engineering manager interviewees, and the Evidence-Based decision model had the second highest total normalized score at 22.76 across the three decision types associated with the interviewees. These total similarity scores for the five decision making models represented a range from 79 percent to 87 percent fit with the maximum total normalized similarity score. These percent fit values for the five decision making models show improvement is still possible in developing a more representative organizational decision making model to better characterize how an organization makes decisions. Based on the information from Table 2.11, a mean of 22.19 and variance of 0.97 was calculated for the total normalized across each decision making model associated with any decision type made by the interviewee.

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Table 2.11   Mean Normalized Similarity Scores Based on Decision Type(s) Made

Decision Making Models	Decision Type			Total Scores	Maximum Total Score
	Strategic	Tactical	Operational		
Normative	7.18	6.79	7.24	21.21	
Descriptive	7.56	7.25	6.97	21.78	
Creative	7.28	6.91	7.39	21.57	
Evidence-Based	7.84	7.60	7.31	22.76	27.00
Rational	7.91	7.67	8.04	23.62	

Table 2.12 shows the mean normalized similarity score for each decision making model and the primary decision type made by an interviewee. This table also shows the total normalized scores associated with each decision model and the primary decision type. The Rational decision making model had the highest total normalized score at 24.83 (maximum total score – 27.00) across the three decision types associated with the technical or engineering manager interviewees, and the Evidence-Based decision making model had the second highest total normalized score at 21.87 across the three decision types associated with the interviewees. These total similarity scores for the five decision making models represented a range from 77 percent to 92 percent fit with the maximum total normalized similarity score. These percent fit values for the five decision making models show improvement is still possible in developing a more representative organizational decision making model to better characterize how an organization makes decisions. Based on the information from Table 2.12, a mean of 21.86 and variance of 2.94 was calculated for the total normalized across each decision making model associated with the primary decision type made by the interviewee.

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Table 2.12   Mean Normalized Similarity Scores Based on Primary Decision Type Made

Decision Making Models	Primary Decision Type			Total Scores	Maximum Total Score
	Strategic	Tactical	Operational		
Normative	6.38	6.63	7.88	20.88	
Descriptive	6.00	7.04	7.78	20.81	
Creative	6.00	6.53	8.40	20.93	27.00
Evidence-Based	6.60	7.67	7.60	21.87	
Rational	9.00	7.33	8.50	24.83	

The interviewees were asked which decision making model holistically best-fits how they make a specific decision type. Table 2.13 shows the interviewees responses regarding the holistic best-fit decision based on the primary decision type associated with the interviewees

Table 2.13   Holistic Best-Fit Decision Making Model Based on Decision Type

Decision Making Models	Decision Type		
	Strategic	Operational	Tactical
Normative (n=0)	0%	0%	0%
Descriptive (n=2)	0%	100%	0%
Creative (n=0)	0%	0%	0%
Evidence-Based (n=4)	0%	50%	50%
Rational (n=2)	25%	25%	50%

Note: (1) Rational Decision Making Model included interviewee that selected both Strategic and Operational decision types.

The results ($\chi2(8, n=8) = 3.556$, p =0.895) conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "decision model will not show a preference to how an organization makes a specific type of decision", could not be rejected. Realizing the small sample size and several "decision making model-decision type" bins represented by zero responses, Table 2.13 shows the eight interviewees that associated with three of the five decision making models were aligned with either an operational or tactical decision type.

2.3.3 Decision Type Impact

Decision making is a complex process regardless of the type of decision type, which strategic, operational, and tactical decision types were included in this study. Multiple decision making models exist, though this study focused on five decision making models, which included Normative, Descriptive, Creative, Evidence-Based, and Rational. Discussing the results shown in Section 2.3.1 and Section 2.3.2, the decision type impact will be comprised of impacts from decision making considerations, similarity scores, and best fit decision model. This section will build to the study's objective, as discussed in Section 2.1.1, an organizational decision model framework coupled to influences from the three decision types, shown in Section 2.1.3.

2.3.3.1 Decision Making Considerations Impact

All five decision making models contain aspects of the four decision making considerations, discussed in Section 2.1.2 and shown in Table 2.14.

Table 2.14   Decision Making Considerations (March, 1991)

Term	Definition
Alternatives	An organization has multiple courses of action to select from
Consequences	An organization understands the consequences associated with the different courses of action
Consistent Preference Ordering	An organization has a consistent means to compare courses of action
Decision Rule	An organization has rules to decide on a single course of action based on the consequences and preferences of all potential courses of action

As the decision making models are further broken down into their individual steps, a high degree of similarity exists between different decision models at this individual decision making step level. An example is the Normative and Rational decision making models include steps that

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state some form of: "generate alternatives." Furthermore, this example highlights the connection

of these five decision making models to the decision making considerations, listed in Table 2.14,

and for this example in particular, the first decision making consideration: "Alternatives." Table

2.15 further illustrates the similarity of decision making model steps across the five decision

making models tied to the four decision making considerations.

Table 2.15   Decision Making Considerations – Decision Model Steps Relational Information

Term	Decision Making Model Steps[1]
Alternatives	Normative Step 1a, Step 1b
	Descriptive Step 1, Step 2
	Rational Step 4
Consequences	Normative Step 2
	Descriptive Step 3a
	Evidence-Based Step 2, Step 3, Step 4
	Rational Step 5
Consistent Preference Ordering	Normative Step 2a, Step 3, Step 3a
	Descriptive 3c
	Evidence-Based Step 2, Step 3, Step 4
	Rational Step 5
Decision Rule	Normative Step 4, Step 4a
	Descriptive Step 4
	Creative Step 5
	Evidence-Based Step 5
	Rational Step 6

Note:(1) Reference APPENDIX A to correlate decision making step number to decision making
model step definition.

As these decision making steps in the five decision making models are aggregated back

into their respective "holistic" decision making models, this study investigated the intersection of

the five decision making models against the three decision types, discussed further in the next

section.

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2.3.3.2   Similarity Score Impact

2.3.3.2.1   Any Decision Type Similarity Score Impact

From the mean normalized similarity scores listed in Table 2.11 connected to any decision made by the engineering or technical manager, the Descriptive and Evidence-Based decision making models were shown to have the strongest relationship with the Strategic decision type. Furthermore, the Normative, Creative, and Rational decision making models were shown to have the strongest relationship with the Operational decision type. Even with the decision making models have the strongest relationship with either Strategic or Operational decision types, all decision making model showed similar strengths of relationships across the three decision types. Consequently, these similarity scores form the foundation that an organization making a specific type of decision does not adhere to a certain decision making model (represented by the five decision making models comprising this study).

In addition, the Rational decision making model had the strongest relationship across the three decision types (scored at 23.62), though the variance between the total similarity scores was 0.97 with the mean at 22.19. With the mean of the total similarity scores and the relatively small variance, these statistics served as another illustration that an organizational structure does not adhere to one of these five decision making models.

Between the best fit of a decision making model at only 87 percent and the mean fit across all five decision making models only at 82 percent, these fit values expose that decision making step(s) are missing from these five decision making models. None of these decision making models best represents how an organization, regardless of the type of decision, makes a decision. This lends to developing a decision making model that will be representative to how an organization regardless of decision type makes a decision.

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2.3.3.2.2   Primary Decision Type Similarity Score Impact

From the mean normalized similarity scores listed in Table 2.12 connected to the primary decision made by the engineering or technical manager, the Rational decision making models were shown to have the strongest relationship with the Strategic decision type. Furthermore, the Evidence-Based decision making model was shown to have the strongest relationship with the Tactical decision type. Finally, the Normative, Descriptive, and Creative decision making models were shown to have the strongest relationship with the Operational decision type. The Rational decision making model showed the strongest relationship across the three decision types. Outside of the Rational decision making model, the total similarity scores for the three decisions types were similar, ranging from 20.81 to 21.87.

With the Rational decision making model had the strongest relationship across the three decision types, the variance for the Primary decision type similarity score was higher than the any decision type similarity score rising from 0.97 to 2.94. However, this variance is still small by only represents less than 11% of the total possible similarity score. These statistics for the primary decision made by the engineering or technical manager generally align with the statistics discussed in Section 7.3.2.1 showing an organizational structure does not adhere to one of these five decision making models. However, these primary decisions made by engineering or technical managers skew towards the Rational decision making model.

Between the best fit of a decision making model at 92 percent and the mean fit across all five decision making models only at 81 percent, these fit values expose that decision making step(s) are missing from these five decision making models. From a primary decision type perspective due to a 92 percent fit, the Rational decision making model can be used as a starting point to construct the organizational decision model, discussed in Section 2.3.4.

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2.3.3.3   Best Fit Decision Model Impact

Expanding the analysis on the five decision models "holistically", Table 2.13 allowed the determination that the null hypothesis, "decision making model will not show a preference to a certain organizational structure or decision type", could not be rejected. With being unable to reject this null hypothesis, this showed as an example that a particular decision type (such as Operational) could not be affiliated with one of the five decision making models (such as Normative). Further summarized as an organization making any type of decision does not adhere to one of these five decision making models.

2.3.4   Organizational Decision Making Model (Decision Type)

Throughout this study, the relationship between five decision making models and three decision types has been investigated. This study has been examining that relationship through this question, "did a certain type of decision(s) adhere to a particular decision making model?," to assist in the determination of an organizational decision making model. Throughout this decision making model-decision type relational analysis discussed in Section 2.3, the results have shown an engineering or technical manager making a certain type of decision does not adhere to a particular decision making model, though these managers making their primary decision skew towards the Rational decision making model. From this inference, a decision making model can be developed representative of common themes between the five decision making models discussed in Section 1.3.3.1 with a focus on the Rational decision making model. In addition, this organizational decision making model can use the decision making considerations, discussed in Section 2.1.2 and Section 1.3.3.1, as a means to educed those common themes between the five decision making models. This decision making model ties

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together the start and end of the decision making process, represented by "identify the problem" and "choose a course of action", respectively, and the four decision making considerations from Table 2.15 to develop the resulting organizational decision making model, regardless of decision type, shown in Table 2.16. This organizational decision making model is also representative for how engineering or technical managers within the organization would make decisions.

Expanding on the organizational decision making model outlined in Table 2.16, the first decision making model step, "Identify problem," emphasizes that an organization should initially address a problem facing the organization. The first step also comprises the concept that an organization needs to arrange the problem in a form that alternatives (courses of actions) could be generated. This first decision making step is pulled directly from the "Identify problem" decision making step in the Rational decision making model, but aligns with the other first decision making steps across the decision making models, excluding the Descriptive decision making model.

The second decision making model step, "Generate alternatives," codifies the knowledge associated with the problem into possible courses of actions that the organization could use to resolve the problem. This second step is pulled directly from the "Generate alternatives" decision making step in the Rational decision making model, though aligns with the other decision making models, namely the Normative and Descriptive decision making models. This step from the Rational decision making model aligns with those two decision making models based on the generalization of the "Alternatives" decision making consideration. This study does not address the "optimal" number of courses of action that an organization should generate,

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though a number of alternatives greater than one should be generated to productively continue through this model.

The third decision making model step, "Determine impact of alternatives," focuses on an organization understanding the consequences associated with the respective alternatives. An organization in comprehending the impact of the respective alternatives should include a time component ranging from real-time (e.g., immediate) to long term (e.g., several years). Since the Rational decision making model does not have this decision making step, this step is a hybrid step based on the "Assess possible impacts of each alternative" decision making model step from the Normative decision making model, and the three gathering evidence decision making model steps from the Evidence-Based decision making model.

The fourth decision making model step, "Establish and weigh decision criteria for alternatives," builds on the identified alternative impacts from the third step, and conveys that an organization specifies a consistent approach to assess the respective alternatives. The fourth step is pulled directly from the "Establish decision criteria" and "weigh decision criteria" decision making model steps in the Rational decision making model, but aligns with the three decision criteria decision making model steps from the Normative decision making model, and the three gathering evidence decision making model steps from the Evidence-Based decision making model.

The fifth decision making model step, "Evaluate alternatives", imparts that an organization utilizes the evaluation approach, determined in the fourth step, to assess the respective alternatives. The fifth step is pulled directly from the "Evaluate alternatives" decision making step in the Rational decision making model, though aligns with the other decision

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making models, namely the Normative, Descriptive, and Evidence-Based decision making models. This step from the Rational decision making model aligns with those three decision making models based on the generalization of the "Consequences" and "Consistent Preference Ordering" decision making considerations.

The sixth decision making model step, "Choose defensible alternative," expresses that an organization determine the course of action that the organization will implement to resolve the problem. The sixth step is pulled from the "Choose best alternative" decision making step in the Rational decision making model, though aligns with the other four decision making models. This step from the Rational decision making model aligns with those three decision making models based on the generalization of the "Consequences" and "Consistent Preference Ordering" decision making considerations. The word "defensible" was chosen over the word "best" or similar word in describing the selected alternative because the selected alternative should be defensible through the traceability from the selected alternative through the evaluation criteria, ultimately back to identifying and structuring the problem. The "best" alternative should be defensible, however other alternatives could be defensible too, thus could be an alternative that could be selected to resolve the problem.

Though the Rational decision making model includes an decision evaluation decision making step, this organizational decision making model does not include a step associated with evaluating the decision after the decision has been made to select a defensible alternative. The previous statement focuses on that this is a decision making model for an organization to follow steps from identifying the problem that needs to be resolved to choosing a defensible alternative

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to implement. Any "post-decision" actions are important for an organization to periodically

evaluate their decisions, but beyond the focus of this organizational decision making model.

Table 2.16   Organizational Decision Making Model

Model Step Number	Model Step Title
1	Identify problem
2	Generate alternatives
3	Determine impact of alternatives
4	Establish and weigh evaluation criteria for alternatives
5	Evaluate alternatives
6	Choose defensible alternative

The organizational decision making model, shown in Table 2.16, has characteristics of

the modern organizational theory model (discussed in Section 2.1.2), reshown with its three

steps: 1) Decision maker considers only two or three alternatives, 2) Decision makers adopts an

alternative if it satisfies certain criteria, and 3) If the alternatives fail to satisfy the criteria, the

decision maker explores additional alternatives. This study did show; regardless of decision

type, a representative organizational decision making model could be established, similar to the

principles of the modern organizational theory model that "a" decision making model could

represent how organizations make decisions. However, the primary decision type, being made

by an engineering or technical manager, skews toward the Rational decision making model. This

highlights similarities to the Rational actor model (discussed in Section 2.1.2), where an

organization would make decisions as a rational actor. Table 2.16 blends these two decision

making model examples (Rational actor model and modern organizational theory model).

Similar to the modern organizational theory model, this study's decision making model captures

decision making steps that include generating alternatives, establishing evaluation criteria for

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these alternatives, and making a decision tied to the decision criteria. These decision model steps from the modern organizational theory model contain aspects of the Rational decision making model. In addition, this study's organizational decision making model delineates five out of the six decision making steps that are consistent with the Rational decision making model. A model lineage can be established from this study's organizational decision making model through the modern organizational theory model and Rational actor model. Though, this study's did not specify a number of alternatives that needed to be generated for evaluation, and additional research can be conducted to determine an "optimal" number of alternatives, which potentially is not two or three alternatives. Lastly, this study's organizational decision making model did not include any "post-decision" actions, though those actions are important to periodically evaluate the decision, but beyond the focus of an organization choosing their defensible alternative.

2.4   Conclusion

Through the exploration of five decision making models and three decision types, discussed in Section 2.1.2 and Section 2.1.3, respectively, interviews of engineering or technical managers allowed the investigation of relationships between decision making models and decision types. The similarity relationships between decision making models and decision types were determined and analyzed to see if a certain type of decision made by an organization adheres to a particular decision making model. The similarity analysis results showed type of decision did not fully adhere to one of these five decision making models, though based on a primary decision type of an organizational engineering or technical manager to skew towards the Rational decision making model. Furthermore, these results allowed the formation of an

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organizational decision making model described in Section 2.3.4. This organizational decision

making model establishes a model lineage to the modern organizational theory and Rational

actor models. This decision model forms one vantage of an organizational decision making

model as this model builds on the exploration of five decision models and the five organizational

structures, and the investigation of how social networks impact organizational decision making,

examined in Study 1 and Study 3, respectively.

2.4.1   Future Work

Future work in researching organizational decision making might involve determining the

fit of the organizational decision making model shown in Table 2.16 to how organizations make

decisions. The research would evaluate if this organizational decision making model would

better fit how an organization would make decisions, regardless of decision type. In addition,

this evaluation could also investigate the "optimal" number of alternatives that an organization

should generate in their decision making. Ultimately, this research could attempt to validate the

organizational decision making model developed in this study compared to the other five

decision making models researched.

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CHAPTER III

SOCIAL NETWORKS AND DECISION MAKING MODELS EVALUATION

3.1   Introduction

Beyond decision making occurring within the "traditional" organization structure, decision making is influenced and occurs within the organizational social groups. Social hierarchies established within these social groups can make similar decisions to ones made within the "traditional" organizational structure (Koski, et al., 2015). How much influence do these decisions made within the organizational social group have on "traditional' organizational decisions making? Social network analysis (SNA) involves the evaluation of social groups and the associated hierarchies for the investigation into attributes utilized by SNA techniques.

3.1.1   Study Objective

This study's objective is to understand the characterization of organizational social networks and their impact on organizational decision making. This study will utilize a survey questionnaire to collect data to develop the social network characterization and understand the impact of the social network on an organization's decision making. This study will compare six network metrics associated with the four organizational structures and the three decision types to determine the impact of the social network. The outcome of this study will be a characterization of organizational social networks and determination of the impact of the social network to support continued development of an organizational decision model framework.

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3.1.2   Social Networks

Social networks exist within any organization and will rapidly self-organize into hierarchies, though the establishment of these social hierarchies will be influenced by the organizational structure type (e.g., matrix, functional, etc.). Within a social hierarchy, the members will be ranked based on their power, influence or dominance exhibited, thus members could be superior or subordinate to other members within the social group. This social hierarchy standing may not entirely align with the established organizational structure member roles (e.g., an organizational member, who is not a manager or supervisor, may have more influence in the social hierarchy than the influence assigned to their organizational structure role) (Koski, et al., 2015). In addition, social hierarchies will establish a system of rules and formal procedures stating what behaviors and decisions are considered acceptable or unacceptable with organizational members (Derbali, 2104).

A social hierarchy's purpose is to organize a social network in order to allocate resources, facilitate social learning, and maximize individual motivation. Since a hierarchy is arranged into member rankings, the members at the top of the hierarchy will be afforded more resources and benefits than the other social group members. Social hierarchies are also highly persuasive in influencing the actions of the social group members (Koski, et al., 2015). Furthermore, social hierarchies define the social problem type most often faced by members of the social network, and establish the range of options available to solve those problems (Dreher, et al., 2016).

3.1.3   Social Network Analysis

As discussed in Section 3.1.2, organizations are comprised of multiple social hierarchies. These hierarchies are also identified as social networks, which can be represented either graphically or mathematically. By depicting a "friendship graph" or other network, an adjacency

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matrix can capture how the network actors are related as a mathematical object. Symmetric matrices represent social actor relationships that are reciprocated, and can represent concepts such as friendship, distance, or similarity in attitude. Non-symmetric matrices denote directed networks, representing concepts such as non-reciprocated friendship, transfer of resources, or authority. The social network graph ties or links representing social relationships can be referred to as dyadic attributes. Examples of dyadic attributes include 1) Social Roles: employer, instructor, or friend; 2) Cognitive: views as similar, or identifies; 3) Actions: talks to, or works with; and 4) Affective: adores, or respects (McCulloh, et al., 2013).

These dyadic ties can also be labeled by: 1) Reciprocity: exchange with other nodes for mutual benefit; 2) Homophily: similarity of two or more nodes; 3) Mulitplexity: number of relations shared (Scott et al., 2011).

Social networks relate to a structured situation or a community of interest, and in an organization, the social network can represent employees (actors) and the relationships could include "reports to", or "delegates to." One example of capturing an organizational social network is an organization is structured into three divisions led by three managers, shown in Figure 3.1. Organizational managers generally are aware of relationships that exist among employees, however probably are not aware of the informal network structure(s) of the entire organization or organizational unit. Within this example, two smaller informal networks are identified, shown in Figure 3.2, and comparing the formal and informal organizational structures shows these employees do not generally go to their manager for information. SNA can assist in determining differences, which can include communication or information flows, in the formal and informal organizational structures, thus social network structures can look different depending on how relationships are defined (McCulloh, et al., 2013).

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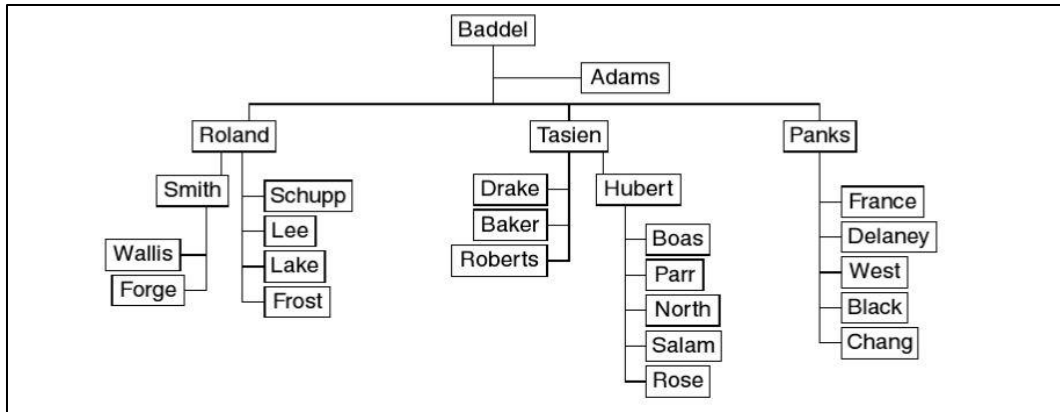
Figure 3.1   Formal Organizational Structure (McCulloh, et al., 2013)
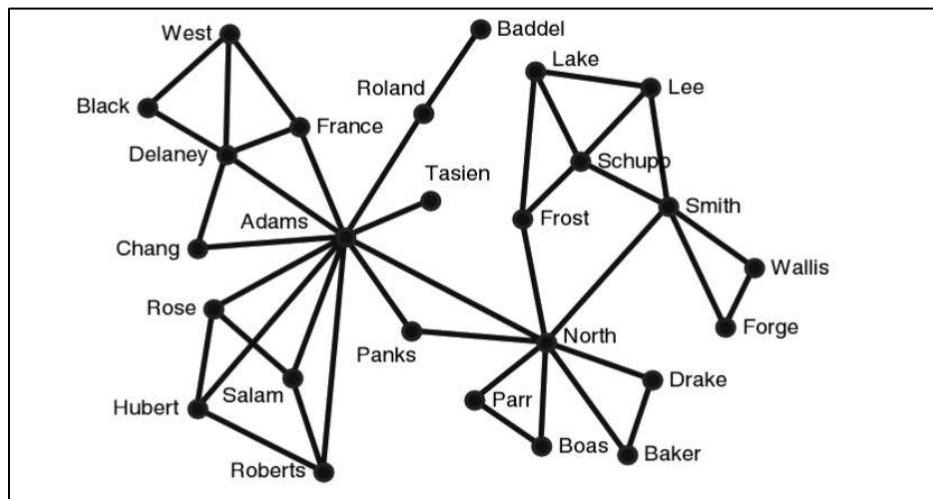
Figure 3.2   Informal Organizational Structure (McCulloh, et al., 2013)

With SNA, the understanding of social relationships requires more than knowing how to measure some network attributes, such as the density of interconnections. It requires assumptions to describe the "under-investigation" social phenomena. These assumptions generally state the network conditions do not affect actors independently and do not state the existence of uniformly cohesive or discretely bounded groups. An overarching idea of SNA

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asserts causation is not located in the individual, but in the social structure, thus leading to individuals with common attributes frequently having similar social network positions. The similar individual outcomes are caused by constraints and opportunities created by similar network positions (Scott et al., 2011).

Four network positions (transmission, adaptation, binding, and exclusion) have been identified, which cause particular outcomes. Transmission treats networks relationships as conduits for types of flows to include information about jobs, workplace identities, and immunity to disease. The transmission position investigates networks having a widespread distribution, network nodes likely to receive flows, and ways that different network structures create different pattern of flows under different circumstances. The adaptation position investigates when multiple actors make the same decision based on their similar network position, thus exposed to similar constraints and opportunities. The binding position examines how networks bind together to act as one unit, and how the internal network structure influences this binding. The exclusion position investigates how the presence of relational tie precludes the existence of another relational tie, affecting the excluded actor's relations with other actors. The exclusion position is evident in markets or other exchanging networks where the availability of alternative partners improves an actor's bargaining power (Scott et al., 2011).

Analyzing the network data allows the investigation into attributes utilized by SNA techniques (cohesion, prominence, etc.) including: 1) Density: proportion of dyads connected to others; 2) Centralization: extent of the network controlled by one actor/one organizational level; 3) Homogeneity: extent of the network comprised by similar actors; 4) Composition: extent of network comprised of actors with particular characteristics; 5) Distance: average path length to

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connect pairs of actors; 6) Strength: average tie strength between pairs of actors (Scott et al., 2011).

SNA provides a technique to analyze network situations to include understanding the links between actors in an organization (both formal and informal) (McCulloh, et al., 2013). SNA represents a perspective by taking the starting point that social life is created by relations and the patterns that these relations form (Scott et al., 2011).

Several techniques exist to assist with SNA including cohesion, a technique to understand relationship strength and access to the same resources between network actors. Cohesion attributes, including density and centralization, indicate the extent of interaction between all network actors, and can reveal "cliques", groups of highly interconnected actors, in the network. The density attribute, calculated as the ratio of the number of actual links in a network to the number of possible links in the network, indicates the degree to which network actors are connected to other network actors. A density principle states high-density network actors are more connected with other network actors than are low-density network actors, represented in Figure 3.3. The centralization attribute measures the extent to which actors are organized or controlled by one network actor. Figure 3.4 shows an example of a highly centralized network with clusters of actors radiating from the central actor. In this network example, information needing to pass from Actor B to Actor C can go through one intermediary, Actor A. If this network was arranged in a circle, additional network intermediates would be available in the information distribution process with a possibility of adding error to the information distribution process, thus arrangement of the network actors affect how effectively information is distributed to all network actors (Haythornthwaite, 1996).

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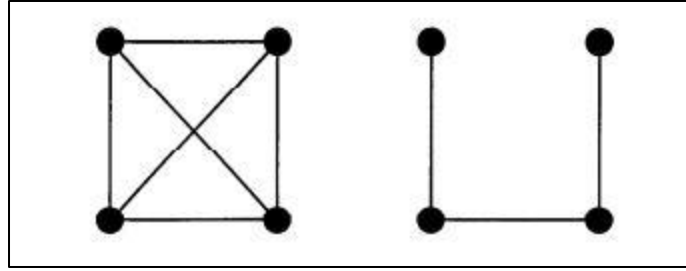
Figure 3.3   High Density and Low Density Networks (Haythornthwaite, 1996)
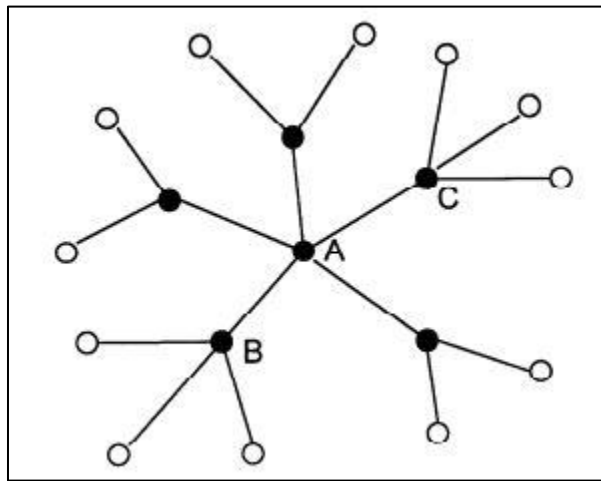
Figure 3.4   Centralized Network (Haythornthwaite, 1996)

Block modeling represents a technique to assess network structural equivalence, defined as identification of actors with similar roles. In block modelling, correlations ae calculated between all actor pairs, then a clustering procedure reorders the actors into sets on the basis of the correlation values. The actors identified as highly correlated, thus structurally equivalent, appear in the result from this technique. Structural equivalence can be used to identify actors who occupy previously unidentified information roles, and who shape the information environment within the network (Haythornthwaite, 1996).

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Node analysis evaluates social network actors (nodes) from different perspectives such as how closely related actors are, who is the center of the network, and what are the distances and homogeneity of actors. This node analysis technique has been utilized with the emergence over the last decade of online social networks and allows the determination of new connections to actors based on finding actors with similar interests, and suggestions of advertisements or products that an actor could be interested in (Gunduz-Oguducu, et al, 2014).

Edge analysis investigates the types of relationships between actors with an edge consisting of attributes describing the nature of the relationship between actors. Social networks are generally multi-relational and actors establish an extensive number of relationships with varying edge strengths and types. An edge analysis can be used to investigate the effectiveness of an organization with edges in the organization representing informal links between organizational actors. Each actor has different capabilities that contribute to organizational effectiveness to include how the actor interacts within the larger network. These interactions between actors represent important factors in evaluating an organization's processes, and are positively related with organizational effectiveness, thus a possible corollary is organizations with densely configured interpersonal edges have more success reaching organizational goals (Gunduz-Oguducu, et al, 2014).

Prominence represents which actor(s) have the most influence over the network. Prominence attributes include centrality of an individual in a network, where centrality is different from centralization by measuring an actor's connection in the network rather than measuring the entire network configuration. Centrality can be measured by counting the number of relationships maintained by each network actor. The central network actor can be referred to as the network star, giving this actor significant access to information from other network actors.

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An isolated network actor has no or limited access to receive and send network information, however though isolated in one network, the actor can be well connected in other networks (Haythornthwaite, 1996). Another prominence attribute is prestige, defined by how many relations a network actor receives versus sends. A prominence example is a highly prestigious network actors enjoys high popularity by receiving ties from numerous other network actors (e.g. professor who has paper(s) citied by several authors). Though, prestige can only be studied using directed graphs, due to how much an actor receives versus sends relational ties (Wasserman, et al., 1994)

Community detection explores how to identify groups of vertices which are more densely connected with each other than with the remainder of the network. A community represents a group of actors in the network sociograph sharing common properties. Analyzing communities has been an invaluable technique in understanding the underlying network structure. Algorithms have been developed to assist in the detection of communities; however, most algorithms can find discrete communities though do not capture the overlapping community structures (Gunduz-Oguducu, et al, 2014).

SNA techniques will assist with the evaluation of the organizational factors to understand the influences of actors within the organizational decision making process. One SNA technique for the organizational network is cohesion, which examines relational strength and access to resources between organizational network actors. Using cohesion to evaluate the organizational network, determining if certain "cliques" exist in the network will highlight social hierarchy, and power dynamics influencing the organizational decision making process. The density attribute of cohesion can be used to see if certain network actor(s) are highly connected (higher density) within the larger organizational network, and if those same network actor(s) are making the

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organizational decision(s). The centralization attribute will assist measuring how the organizational actors are organized and if organized around one central actor. The findings from utilizing this cohesion technique can assist with determining if organizational decision making is a distributed process or centralized around an actor or set of actors (formally – organization structure versus informally- "social" organization structure) relative to the surveyed organizations.

Assessing structural equivalence within the organizational structure will be an additional technique to analyze organizational factors. By assessing structural equivalence, highly-correlated actors can be identified and will determine if these organizational actors occupied unidentified information roles and are influencing the information environment within the organization (e.g. are these actors also the "formal" decision makers in the organization?). The findings from utilizing structural equivalence can also support the determination of redundancy in decision makers referenced against the formal organizational type.

Evaluating organizational network prominence will identify which organizational actor(s) have the most influence over the organization. The centrality attribute can be used to determine if an organizational network star exists, and will gage if this organizational network star is also making the organizational decisions. In addition, the prestige attribute can be used to measure the formal versus the social organizational structures to determine if a possible prestigious organizational actor is influencing the organizational decision making process.

Overall, utilizing SNA will assist in determining underlying organizational structures (especially informally) beyond the conventional formal organizational type (functional, matrix, etc.) and the impact of the social hierarchy of these organizations on decision making processes.

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3.2 Methods

This section discusses the data collection and the evaluation methods to understand the impact of the social network on organizational decision making.

3.2.1 Survey Questionnaire

The survey questionnaire comprised items to determine the impact of a social network within organizations. The survey comprised of items utilizing six SNA attributes (such as density, centralization, etc.) to understand the social links between members in an organization, allowing determination of how social networks affect decision making in an organization. The items are framed by organizational structures and decision types to characterize the effect of the social network on organizational decision making. The survey included different types of items including: 1) Single-answer multiple choice (Example survey item: What organizational structure does your organization most adhere to?); 2) A five-point Likert scale was used, ranging from Strongly Disagree to Strongly Agree (Vagias, 2006). (Example survey item: Does your organization have a large number of people (in comparison with the organizational size) associated with the social network?)

The survey questionnaire is shown in APPENDIX D. This survey questionnaire was approved by Mississippi State University IRB with study number IRB-19-081, "Organizational Decision Making Methods used by Technical Managers."

The survey questionnaire was imported into Qualtrics, an online survey software tool (Qualtrics), then integrated with Amazon Mechanical Turk, a crowdsourcing marketplace for virtually completing jobs to a distributed workforce (Amazon Mechanical Turk). Two batches were submitted with eighty-two survey responses being selected for utilization of the evaluation

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described in Section 3.2.2.   All 82 survey responses selected for this evaluation were usable responses.

3.2.2   Social Network – Decision Making Processes Evaluation

3.2.2.1   Survey Results Analysis

The survey results analysis started with the utilization of descriptive statistics to organize and summarize the responses from the survey items. Descriptive statistics examples included: 1) Percent total of survey respondents who associated with one of the four organizational structure types; and 2) Percent total of survey respondents who answered with one of the five response anchors for the Likert Scale survey items.

Results from three survey items, "Describe the social networks in your organization", "If agree or strongly agree, please state at which organizational level (examples: executive, division, branch)", and "Is there a particular professional characteristic which all social network members have (e.g. all social network members are engineers)?," were analyzed with the NVivo data analysis software. The NVivo software allowed for the analysis of unstructured text from the survey, and is produced by QSR International (University of Illinois).

The survey results were additionally grouped based on survey respondents selecting a specific organizational structure and specific decision type. An example: All matrix organizational structure selections were grouped together for analysis regardless of decision type and all strategic decision type selections were grouped together for analysis regardless of organizational structure.

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3.2.2.2   Social Network Analysis

The Social Network analysis focused on organizational social networks, relating to these metrics shown in Table 3.1.

Table 3.1   Social Network Analysis Metrics

Metric	Definition	Survey Item[1]
Density	Proportion of dyads connected to others	Your organization has a large number of people (in comparison with the organizational size) associated with the social network.
Centralization	Extent of the network controlled by one actor/one organizational level	The social network clusters around a specific organizational level/group within the organization
Homogeneity	Extent of the network comprised by similar actors	The social network is comprised of a similar type of organizational member (e.g. all members are supervisors).
Composition	Extent of network comprised of actors with particular characteristics	Is there a particular professional characteristic which all social network members have (e.g. all social network members are engineers)?
Strength	Average tie strength between pairs of actors	There is a strong social connection between all members of the organizational social network.
Distance	Average path length to connect pairs of actors	All members of the organizational social network are at the same physical site (e.g. all work on the same campus or office complex).

Note:(1) Items listed in this table that are represented by a Likert Scale included the following: "Please rate your level of agreement with the following statement:"

Survey responses for the network metric survey items, listed in the previous paragraph, were sorted into two classes: organizational structure and decision type. For each class, the

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Likert Scale item responses relating to each network metric were initially sorted into the five Likert Scale response anchors for analysis via descriptive statistics. Subsequently, the Likert Scale response anchors were sorted into three groups to support statistical hypothesis testing: 1) Strongly Agree and Agree responses, 2) Neither Agree or Disagree responses, and 3) Strongly Disagree and Disagree responses. Other survey items types, such as positive/negative responses, were also sorted into the same two classes, organizational structure and decision type, to support statistical hypothesis testing.

A hypothesis test procedure, Chi Square Test was performed on the sorted data for each SNA metric (grouped by organizational structure and decision type). The $\chi 2obs$ value was compared to the $\chi 2exp$ value. If the $\chi 2obs$ value was greater than or equal to the $\chi 2exp$ value, then the null hypothesis was rejected. If the $\chi 2obs$ value was less than the $\chi 2exp$ value, the null hypothesis could not be rejected. This analysis determined whether the experimental observed data was significantly different from the hypothesized expected data (Weaver et. al., 2017).

After determining the statistical significance of the observed network metric data, the responses were analyzed for the relationship between the social network metric and organizational structure, and the social network metric and decision type. A social network metric and organizational structure example: The density network metric (regardless of the three decision types) may have shown high density, representing a large fraction of possible relationships currently exist in this social network with the organizational structure. This could be descriptively reported as a network where individuals seek a large number of people to seek information and communicate about issues (Brun et. al., 2018).

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A summary of the network metrics (viewed from the organizational structure and decision type perspective) was generated to report the impact of a social network depending on the organizational structure or decision type.

3.3 Results

This section reports the descriptive statistics to summarize the responses from the survey items in Section 3.3.1 followed by Sections 3.3.2 through 3.3.7 to discuss each social network metric. Section 3.3.8 discusses the overall impact of social networks on organizational decision making.

3.3.1 SNA Descriptive Statistics

The SNA descriptive statistics range from percent total of survey respondents who associated with one of the four organizational structure types to percent total of survey respondents who answered with one of the five response anchors for the Likert Scale survey items. This section discusses in order of the survey items listed in APPENDIX D. The first two survey items were screening items with responses for "Are you an engineering or technical manager?", indicating 86.6% were an engineering or technical manager and 13.4% were not. However, the second survey item, "Name your Organizational Title/Position", was also used to determine if the survey respondent was at least an engineering or technical worker. Reponses from this second survey item were reviewed with no further data analysis required on this screening item in the survey. Responses for the third survey item, "Which of these four organizational structure best characterize s your organization?", are shown in Table 3.2. Though flat organizations were not evaluated in Studies 1 and 2, flat organization remained as an option for this survey item. Surveyed engineering or technical managers and workers mostly worked in

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a functional organizational structure at 39% with only 6.1% worked in a flat organizational

structure. Discussed in additional detail in the following sections, the social network metrics did

not show a preference to a certain organizational structure.

Table 3.2   Organizational Structure Survey Responses (n=82)

Organizational Structure	Percent Total
Matrix	24.4%
Functional	39%
Divisional	30.5%
Flat	6.1%

Responses for the survey item, "Which of the five decision models best fits how your

organization makes decisions?", are shown in Table 3.3. Surveyed engineering or technical

managers and workers mostly made decisions with the Rational decision making process at

42.7%, and made decisions with the Creative and Descriptive decision making processes at 6.1%

and 7.3%, respectively.

Table 3.3   Decision Making Process Survey Responses (n=82)

Best Fit Process	Percent Total
Normative	22%
Descriptive	7.3%
Creative	6.1%
Evidence-Based	22%
Rational	42.7%

Responses for the survey item, "Choose a decision step(s) from one of the five decision

models that your organization strongly adheres to," are shown in Table 3.4. All survey

respondents chose only one decision making model step, and decision making model steps not

listed in the table received zero responses. Step 6, "Choose the best alternative", in the Rational

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decision making process received the highest percentage of responses from the surveyed engineering or technical managers and workers at 11%. Step 4," Evaluate and compare alternatives", in the Normative decision making process received the second highest percentage of responses at 9.8%. Across the five decision making processes, over thirty-four percent of survey respondents selected decision making steps associated with evaluating or selecting an alternative, to include Normative Steps 4 and 4a, Evidence-Based Step 5, and Rational Steps 5 and 6, as a step their organization adhered to.

Table 3.4　　　Decision Making Process Step Survey Responses (n=82)

Process	Step	Step Description	Percent Total
Normative	1a	Generate proposed alternatives	2.4%
	1b	Specify objectives and attributes	2.4%
	2	Assess possible impacts of each alternative	4.9%
	3	Determine preferences of decision making	2.4%
	4	Evaluate and compare alternatives	9.8%
	4a	Evaluate proposed alternatives and conduct sensitivity analysis	1.2%
Descriptive	3	Recognition	2.4%
	3a	Expectancies	1.2%
	5	Implement course of action	2.4%
Creative	1	Problem recognition	6.1%
	5	Verification and application	2.4%
Evidence-Based	1	Identify the problem	4.9%
	2	Gather internal evidence and evaluate its relevance and validity	6.1%
	4	Gather evidence from stakeholders affected by decision and consider implications	2.4%
	5	Integrate and appraise all data and make decision	6.1%

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Table 3.4 (continued)

	1	Identify the problem	7.3%
	2	Establish decision criteria	3.7%
	3	Weigh decision criteria	6.1%
	4	Generate alternatives	4.9%
Rational	5	Evaluate alternatives	6.1%
	6	Choose best alternative	11.0%
	7	Implement decision	3.7%
	8	Evaluate decision	8.5%

Responses for the two survey items, "What type of decision(s) do you make in your position?" and "What is your primary decision type for your position?", are shown in Table 3.5 and Table 3.6. Twenty-three survey respondent selected multiple decision types. Surveyed engineering or technical managers and workers mainly made operational decisions in their organizations regardless if they made multiple types of decisions.

Table 3.5   Decision Type(s) Survey Responses (n=82)

Decision Types	Percent Total
Strategic	28%
Tactical	31.7%
Operational	69.5%

Note:(1) 23 survey respondents selected multiple decision types. One survey respondents selected all three decision types.

Table 3.6   Primary Decision Type Survey Responses (n=82)

Primary Decision Types	Percent Total
Strategic	18.3%
Tactical	24.4%
Operational	57.3%

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The survey item," Describe the social networks in your organization.", responses were evaluated with the NVivo data analysis software with coding structure shown in Figure 3.5. Sixty-three survey respondents discussed the number of social networks in the organization with 56 survey respondents stated there was multiple social networks in their organizations and seven stated there was only one social network in their organization, responses shown in Figure 3.5. Forty-seven survey respondents discussed the alignment of their organization's social network with 39 survey respondents stated the social network aligned with their organizational structure while eight stated the social network did not align. Thirty-five survey respondents discussed the organizational level/group that the social networks centralized around, with the following responses shown in Table 3.7.

Table 3.7   Social Network Description – Organizational Level/Group (n=35)

Organizational Level/Group	Percent Total
Peers	43%
Departments	17%
Divisions	14%
Upper Management	14%
Executive	6%
Other	6%

Sixteen survey respondents discussed the strength of their social network with 12 survey respondents stated a strong social network and four survey respondents stated a weak social network. Five survey respondents discussed the size of their social network with four survey respondents stated a large social network and one survey respondent stated a small social network. Only one survey respondent discussed the location of their social network with stating the social network was connected to the same physical location based on the organization's structure (e.g. an organization division located at the same campus).

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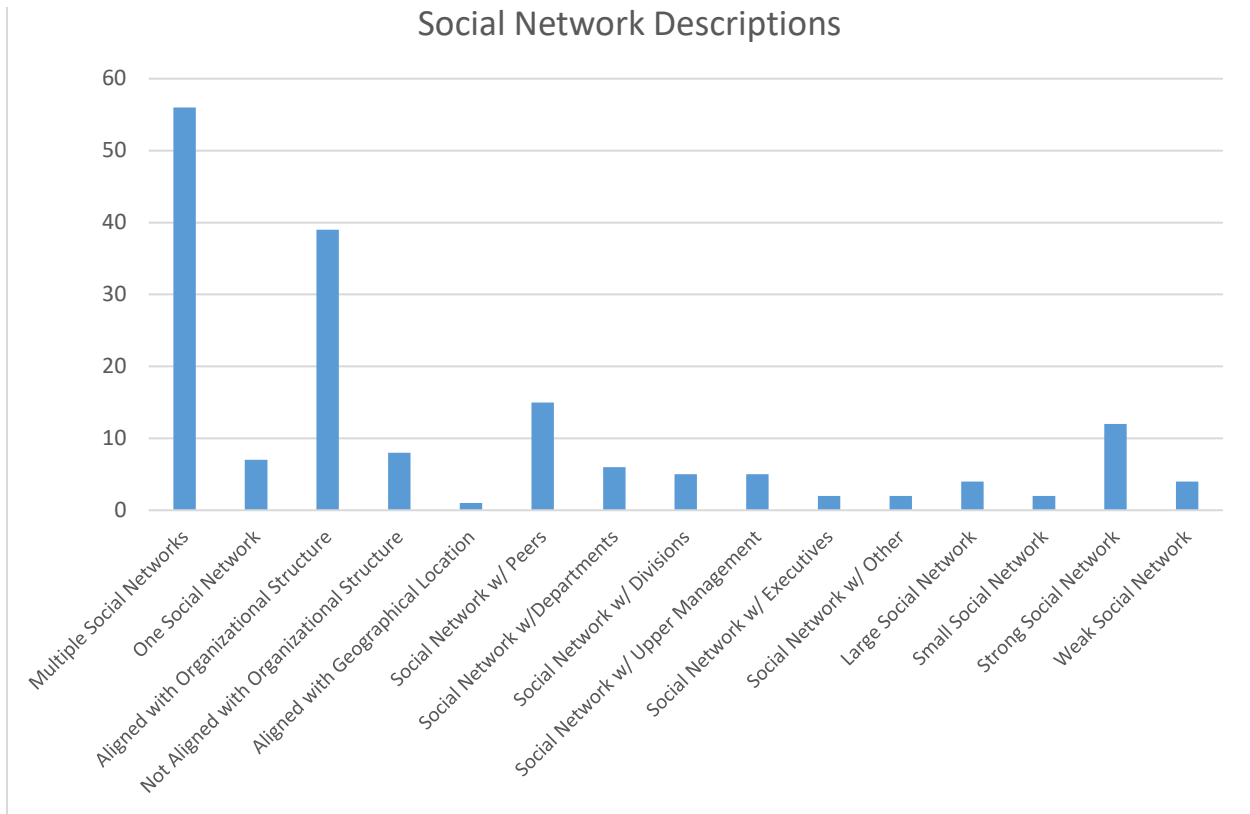
Figure 3.5   Social Network Description Survey Responses

Responses for the survey item, "Please rate your level of agreement with the following statement: Your organization has a large number of people (in comparison with the organizational size) associated with the social network", are shown in Table 3.8. Sixty-seven percent of surveyed engineering or technical managers and workers either "Agree" or "Strongly Agree" with having a high density of organizational members in the organization's social network(s).

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Table 3.8   Social Network Analysis Metrics and Social Network Influence Survey Responses (n=82)

Response Anchors	Density Metric	Centralization Metric	Homogeneity Metric	Strength Metric	Distance Metric	Social Network Influence
	Percent Total					
Strongly Agree	11.0%	8.5%	7.3%	9.8%	22.0%	11.0%
Agree	56.1%	51.2%	42.7%	62.2%	32.9%	56.1%
Neither Agree nor Disagree	15.9%	22.0%	17.1%	20.7%	14.6%	15.9%
Disagree	17.1%	15.9%	24.4%	7.3%	24.4%	15.9%
Strongly Disagree	0.0%	2.4%	8.5%	0.0%	6.1%	1.2%

Responses for the survey item, "Please rate your level of agreement with the following statement: The social network clusters around a specific organizational level/group within the organization.", are shown in Table 3.8. Nearly sixty percent of surveyed engineering or technical managers and workers either "Agree" or "Strongly Agree" with having a centralization of organizational members in the organization's social network(s) around a certain organizational level.

If the surveyed engineering or technical managers and workers responded with "Agree or "Strongly Agree" from the previous item, the following survey item, "please state at which organizational level (examples: executive, division, branch)", was answered. These responses were analyzed with the NViVo data analysis software with the following coding structure shown in Figure 3.6.

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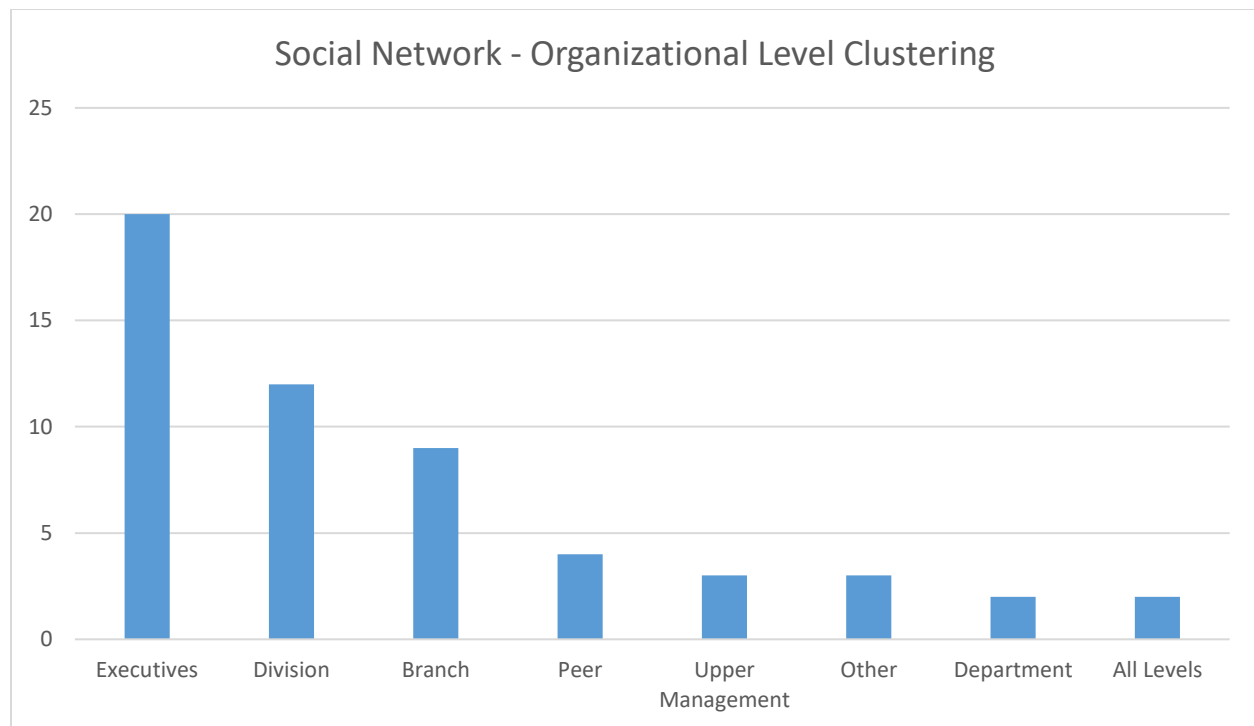
Figure 3.6   Organizational Level that Social Networks Centralize Around

The NVivo-analyzed responses were also organized into Table 3.9 to determine the number of respondents that selected the different organizational levels. These multiple selections relate to the concept of multiple social networks in an organization. Forty-nine survey respondents answered this survey item with several including multiple responses. A majority of responses showed at least a social network in their organizations centralized around the higher levels of the organization's management.

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Table 3.9   Organizational Level that Social Networks Centralize Around (n=49)

Organizational Level	Percent Total
Executives	24%
Upper Management	61%
Division	41%
Branch	18%
Peer	8%
Other	6%
Department	4%
All Levels	4%

Note:(1) Survey respondents in some cases selected multiple organizational level responses.

Responses for the survey item, "The social network is comprised of a similar type of organizational member (e.g. all members are supervisors)", are shown in Table 3.8. Only half of surveyed engineering or technical managers and workers either "Agree" or "Strongly Agree" with having homogeneous organizational members within the organization's social network(s).

The survey item, "Is there a particular professional characteristic which all social network members have (e.g. all social network members are engineers)?", responses were evaluated with the NVivo data analysis software with the following coding structure shown in Figure 3.7.

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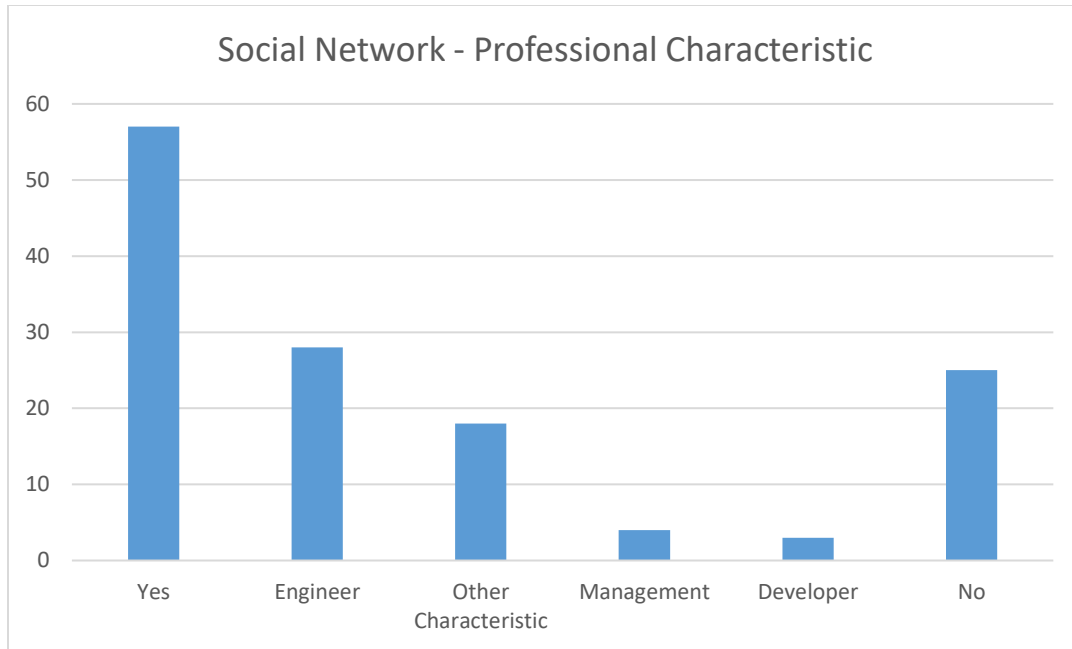
Figure 3.7   Social Network Member Professional Characteristic Survey Responses

The NVivo-analyzed responses showed seventy percent of surveyed engineering or technical managers and workers (57 respondents) agreed social network members had a particular professional characteristic. The positive responses were further broken down into the type of professional characteristic shown in Table 3.10.

Table 3.10   Professional Characteristic Survey Responses (n=57)

Professional Characteristic	Percent Total
Engineer	49%
Other professional characteristic	32%
Manager	7%
No additional information provided	7%
Software Developer	5%

Responses for survey item, "Please rate your level of agreement with the following statement: There is a strong social connection between all members of the organizational social

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network", are shown in Table 3.8. Seventy-two percent of surveyed engineering or technical managers and workers either "Agree" or "Strongly Agree" with having a strong social connection between organizational members in the organization's social network(s).

Responses for the survey item, "Please rate your level of agreement with the following statement: All members of the organizational social network are at the same physical site (e.g. all work on the same campus or office complex)", are shown in Table 3.8. Only fifty-five percent of surveyed engineering or technical managers and workers either "Agree" or "Strongly Agree" with having the organization's social network members located at the same physical site.

Responses for the survey item, "Do decisions made by the social network follow the same decision model as the overall organization?", are shown in Table 3.11. Over seventy-four percent of surveyed engineering or technical managers and workers agreed their social network decision making process follows the same process as their organization's decision making process.

Table 3.11   Organizational Structure - Social Network Decision Process Survey Responses
           (n=82)

Response Option	Percent Total
Yes	74.4%
No	25.6%

If the surveyed engineering or technical managers and workers did not agree with the survey item, "Do decisions made by the social network follow the same decision model as the overall organization?", then they answered this survey item, "If not, which decision model best characterizes how the social network makes decisions?", with responses shown in Table 3.12.

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Nearly forty-three percent of the 21 survey respondents, who answered survey item #14A, answered their social network made decision by the Creative decision making process.

Table 3.12   Social Network Decision Making Process Survey Responses (n=21)

Decision Making Process	Percent Total
Normative	14.3%
Descriptive	28.6%
Creative	42.9%
Evidence-Based	4.8%
Rational	9.5%

Responses for the survey item, "Please rate your level of agreement with the following statement: Decisions made by the social network impact decisions made by the organization", are shown in Table 3.8. Over sixty-seven percent surveyed engineering or technical managers and workers either "Agree" or "Strongly Agree" their social network(s) influenced organizational decisions.

If the surveyed engineering or technical managers and workers responded with "Agree or "Strongly Agree" on this survey item, "Please rate your level of agreement with the following statement: Decisions made by the social network impact decisions made by the organization.", this survey item "Please state what types of organizational decision?", was answered with responses shown in Table 3.13. Nearly fifty-two percent of the 54 respondents, who answered survey item #15A, answered their social network impacted organizational operational decisions. One survey respondent, who answered "Agree" did not answer this survey item.

Table 3.13   Decision Types Impacted by Organization's Social Networks (n=54)

Decision Types	Percent Total
Strategic	35.2%
Tactical	38.9%
Operational	51.9%

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After reviewing the responses, no additional information was used from the last survey item, "Do you have any additional comments?"

3.3.2 SNA Density Metric

The SNA Density metric evaluates the proportion of network members connected to other network members. From Table 3.8, sixty-seven percent of surveyed engineering or technical managers and workers at least agreed with having a high density of organizational members in the organization's social network(s). The survey responses were additionally binned by organizational structure and decision type, shown in Table 3.14 and Table 3.15 respectively, and analysis was performed as described in Section 3.2.2.2.

Table 3.14   Density Metric Responses by Organizational Structure

Response Anchors	Matrix	Functional	Divisional	Flat	Total
Agree & Strongly Agree	17	17	19	2	55
Neither Agree or Disagree	1	9	2	1	13
Disagree & Strongly Disagree	2	6	4	2	14
Total	20	32	25	5	

Based on the binned responses from Table 3.14, the SNA Density metric Chi Square Test results, between survey response anchors and organizational structure, are the following ($\chi2(6$, n=82) = 10.47, p =0.106). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are comprised of a high density of organizational members regardless of organizational structure.

Based on the binned responses from Table 3.15, the SNA Density metric Chi Square Test results, between survey response anchors and decision type, are the following ($\chi2(4, n=82) = 7.02$, p =0.135). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are comprised of a high density of organizational members regardless of the type of decision the organizational members make.

Table 3.15　　Density Metric Responses by Decision Type

Response Anchors	Strategic	Tactical	Operational	Total
Agree & Strongly Agree	10	15	30	55
Neither Agree or Disagree	4	4	5	13
Disagree & Strongly Disagree	1	1	12	14
Total	15	20	47	

3.3.3　　SNA Centralization Metric

The SNA Centralization metric evaluates the extent the organization's social network(s) is controlled by one actor or one organizational level. From Table 3.8, nearly sixty percent of surveyed engineering or technical managers and workers at least agreed with having a centralization of organizational members in the organization's social network(s) around a certain organizational level. The survey responses were additionally binned by organizational structure and decision type, shown in Table 3.16 and Table 3.17 respectively, and analysis was performed as described in Section 3.2.2.2.

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Table 3.16   Centralization Metric by Organizational Structure

Response Anchors	Matrix	Functional	Divisional	Flat	Total
Agree & Strongly Agree	13	14	19	3	49
Neither Agree or Disagree	3	9	5	1	18
Disagree & Strongly Disagree	4	9	1	1	15
Total	20	32	25	5	

Based on the binned responses from Table 3.16, the SNA Centralization metric Chi Square Test results, between survey response anchors and organizational structure, are the following ($\chi2(6, n=82) = 8.139$, p =0.228). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are centralized around a certain organizational level regardless of organizational structure.

Based on the binned responses from Table 3.17, the SNA Centralization metric Chi Square Test results, between survey response anchors and decision type, are the following ($\chi2(4, n=82) = 9.49$, p =0.330). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are centralized around a certain organizational level regardless of the type of decision the organizational members make.

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Table 3.17   Centralization Metric by Decision Type

Response Anchors	Strategic	Tactical	Operational	Total
Agree & Strongly Agree	11	12	26	49
Neither Agree or Disagree	3	6	9	18
Disagree & Strongly Disagree	1	2	12	15
Total	15	20	47	

3.3.4   SNA Homogeneity Metric

The SNA Homogeneity metric evaluates the extent the organization's social network(s) is comprised of similar organizational members. From Table 3.8, only half of surveyed engineering or technical managers and workers at least agreed with having homogeneous organizational members within the organization's social network(s). The survey responses were additionally binned by organizational structure and decision type, shown in Table 3.18 and Table 3.19, respectively, and analysis was performed as described in Section 3.2.2.2.

Table 3.18   Homogeneity Metric by Organizational Structure

Response Anchors	Matrix	Functional	Divisional	Flat	Total
Agree & Strongly Agree	11	18	10	2	41
Neither Agree or Disagree	2	4	8	0	14
Disagree & Strongly Disagree	7	10	7	3	27
Total	20	32	25	5	

Based on the binned responses from Table 3.18, the SNA Homogeneity metric Chi Square Test results, between survey response anchors and organizational structure, are ($\chi2(6$, n=82) = 7.395, p =0.286). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain

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organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are comprised of homogeneous organizational members regardless of organizational structure.

Based on the binned responses from Table 3.19, the SNA Homogeneity metric Chi Square Test results, between survey response anchors and decision type, ($\chi2(4, n=82) = 10.047$, p =0.040). These results conclude the $\chi2obs$ value was more than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could be rejected. Thus, organizational social network(s) are comprised of homogeneous organizational members though based on the type of decision the organizational members make.

Table 3.19   Homogeneity Metric by Decision Type

Response Anchors	Strategic	Tactical	Operational	Total
Agree & Strongly Agree	12	10	19	41
Neither Agree or Disagree	2	5	7	14
Disagree & Strongly Disagree	1	5	21	27
Total	15	20	47	

3.3.5   SNA Composition Metric

The SNA Composition metric evaluates the extent of the social network comprised of network members with particular professional characteristics. From Figure 3.7, seventy percent of surveyed engineering or technical managers and workers agreed social network members shared a particular professional characteristic. Forty-nine percent of the positive responses stated an engineering professional characteristic. The survey responses were additionally binned by organizational structure and decision type, shown in Table 3.20 and Table 3.21 respectively, and analysis was performed as described in Section 3.2.2.2.

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Table 3.20   Composition Metric by Organizational Structure

Responses	Matrix	Functional	Divisional	Flat	Total
Yes	16	21	16	4	57
No	4	11	9	1	25
Total	20	32	25	5	

Based on the binned responses from Table 3.20, the SNA Composition metric Chi Square Test results, between survey responses and organizational structure, are ($\chi2(6, n=82) = 1.88$, p =0.597). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) were comprised of network members sharing a particular professional characteristic regardless of organizational structure.

Based on the binned responses from Table 3.21, the SNA Composition metric Chi Square Test results, between survey response anchors and decision type, are ($\chi2(2, n=82) = 1.79$, p =0.411). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) were comprised of network members sharing a particular professional characteristic regardless of the type of decision the organizational members make.

Table 3.21   Composition Metric by Decision Type

Responses	Strategic	Tactical	Operational	Total
Yes	12	15	30	57
No	3	5	17	25
Total	15	20	47	

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3.3.6   SNA Strength Metric

The SNA Strength metric evaluates the average tie strength between pairs of network members. From Table 3.8, seventy-two percent of surveyed engineering or technical managers and workers at least agreed with having a strong social connection between organizational members in the organization's social network(s). The survey responses were additionally binned by organizational structure and decision type, shown in Table 3.22 and Table 3.23 respectively, and analysis was performed as described in Section 3.2.2.2.

Table 3.22   Strength Metric by Organizational Structure

Response Anchors	Matrix	Functional	Divisional	Flat	Total
Agree & Strongly Agree	14	27	14	4	59
Neither Agree or Disagree	4	4	8	1	17
Disagree & Strongly Disagree	2	1	3	0	6
Total	20	32	25	5	

Based on the binned responses from Table 3.22, the SNA Strength metric Chi Square Test results, between survey response anchors and organizational structure, are ($\chi2(6, n=82) = 6.29$, p =0.391). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are comprised of strong social connections between organizational members regardless of organizational structure.

Based on the binned responses from Table 3.23, the SNA Strength metric Chi Square Test results, between survey response anchors and decision type, are ($\chi2(4, n=82) = 2.985$, p =0.56). These results conclude the $\chi2obs$ value was less than the $\chi2exp$ value and the null

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hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are comprised of strong social connections between organizational members regardless of the type of decision the organizational members make.

Table 3.23   Strength Metric by Decision Type

Response Anchors	Strategic	Tactical	Operational	Total
Agree & Strongly Agree	12	16	31	59
Neither Agree or Disagree	3	3	11	17
Disagree & Strongly Disagree	0	1	5	6
Total	15	20	47	

3.3.7   SNA Distance Metric

The SNA Distance metric evaluates the average path length to connect pairs of network members. From Table 3.8, fifty-five percent of surveyed engineering or technical managers and workers at least agreed with having the organization's social network members located at the same physical site. The survey responses were additionally binned by organizational structure and decision type, shown in Table 3.24 and Table 3.25 respectively, and analysis was performed as described in Section 3.2.2.2.

Table 3.24   Distance Metric by Organizational Structure

Response Anchors	Matrix	Functional	Divisional	Flat	Total
Agree & Strongly Agree	9	20	14	2	45
Neither Agree or Disagree	2	4	4	2	12
Disagree & Strongly Disagree	9	8	7	1	25
Total	20	32	25	5	

Based on the binned responses from Table 3.24, the SNA Distance metric Chi Square Test results, between survey response anchors and organizational structure, are ($\chi^2(6, n=82)$ = 5.454, p =0.487). These results conclude the χ^2_{obs} value was less than the χ^2_{exp} value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are comprised of having the organization's social network members located at the same physical site regardless of organizational structure.

Based on the binned responses from Table 3.25, the SNA Distance metric Chi Square Test results, between survey response anchors and decision type, are ($\chi^2(4, n=82)$ = 3.362, p =0.499). These results conclude the χ^2_{obs} value was less than the χ^2_{exp} value and the null hypothesis, "a social network metric will not show a preference to a certain organizational structure or decision type", could not be rejected. Thus, organizational social network(s) are comprised of having the organization's social network members located at the same physical site regardless of the type of decision the organizational members make.

Table 3.25   Distance Metric by Decision Type

Response Anchors	Strategic	Tactical	Operational	Total
Agree & Strongly Agree	8	12	25	45
Neither Agree or Disagree	4	3	5	12
Disagree & Strongly Disagree	3	5	17	25
Total	15	20	47	

3.3.8   Social Network Impact

3.3.8.1   Social Network Metrics Impact

From Section 3.3.2 to Section 3.3.7, the results from the six social network metrics showed if there was variability to organizational impacts based on the organizational structure

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type or decision type. An organizational social network showed a high density of organizational members that participated in their organization's social network regardless of type of organization (including functional, divisional, matrix, and flat) and regardless of decision type (including strategic, tactical, and operational). Thus, an organization will contain social network(s) comprising a large number of organizational members (in comparison with the organizational size). This high density of organizational members demonstrates an aspect of "high" cohesion within an organizational social network. In conjunction with other social network attributes like centrality, a possible organizational social network star can be determined, and since a social network has a high density of organizational members, multiple social links exist for a possible organizational social network star to influence organizational decisions.

An organizational social network demonstrated centralization around a certain organizational level regardless of type of organization (including functional, divisional, matrix, and flat) and regardless of decision type (including strategic, tactical, and operational). Thus, an organization will contain social network(s) that will cluster around a specific organizational level/group within the organization. This centralization around a certain organizational level supports that a possible organizational social network star might exist within this certain organizational level. A possible organizational social network star at this certain organizational level would have a greater measure of centrality due to the multiple social links from the high density of organizational members in the organizational social network.

An organizational social network comprised of homogeneous organizational members regardless of type of organization (including functional, divisional, matrix, and flat). Thus, an organization, structured as functional, divisional, matrix, or flat, will be comprised of similar

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types of organizational members (e.g., all members are supervisors) in the organization's social network(s). However, an organizational social network comprised of homogeneous organizational members based on the type of decisions those organizational members made (ranging from strategic, tactical, and operational). Homogeneous organizational members in an organizational social network(s) aligns with previous research that within a social structure, those individuals would have common attributes (Scott et al., 2011).

An organizational social network comprised of organizational members with similar professional characteristics (engineer, software developer, etc.) regardless of type of organization (including functional, divisional, matrix, and flat) and regardless of decision type (including strategic, tactical, and operational). Thus, an organization will contain social network(s) that contain organizational member with similar professional characteristics. As with the homogeneity social network metric, an organizational social network consisting of a similar organizational member composition (e.g., members with common professional characteristics) aligns with previous research that within a social structure, those individuals would have common attributes (Scott et al., 2011).

An organizational social network showed a strong connection between its members regardless of type of organization (including functional, divisional, matrix, and flat) and regardless of decision type (including strategic, tactical, and operational). Thus, an organization will contain social network(s) with strong social bonds between the organizational members in the social networks. These strong social bonds between network members establishes another aspect of "high" degree of cohesion within the organizational social network, and the resulting "cliques" that would exist in the organizational social network. These "cliques" ultimately have the potential to influence decisions within the organization.

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An organizational social network's members were located at same physical location regardless of type of organization (including functional, divisional, matrix, and flat) and regardless of decision type (including strategic, tactical, and operational). Thus, an organization will contain social network(s) that contain organizational members from the same physical location (e.g. work on same campus or office complex). With social network members at the same physical location, this contributes to a "high" cohesion of the organizational social network due to more possible social interactions amongst organization members at this location. Consequently, social network members at the same physical location leads to the increase of density of the organizational social network.

Table 3.26 serves a summary of characterizing organizational social networks for any of the four researched organizational structures.

Table 3.26   Organizational Social Network Characterization – Organizational Structure

Organizational Social Network Characterizations
Large number of organizational members (in comparison with the organizational size)
Cluster around a specific organizational level/group within the organization
Similar types of organizational members (e.g., all members are supervisors)
Similar professional characteristics in organizational members
Strong social bonds between the organizational members
Same physical location (e.g. work on same campus or office complex) for organizational members

Table 3.27 serves a summary of characterizing organizational social networks for any of the three researched decision types. The one outlier was organizational social networks will

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comprise of similar organizational members based on the type of decisions those organizational members make (e.g. a social network will be comprised of supervisors making tactical decisions).

Table 3.27   Organizational Social Network Characterization – Decision Type

Organizational Social Network Characterizations
Large number of organizational members (in comparison with the organizational size)
Cluster around a specific organizational level/group within the organization
Similar professional characteristics in organizational members
Strong social bonds between the organizational members
Same physical location (e.g. work on same campus or office complex) for organizational members

3.3.8.2   Social Network Impact – Organizational Decision Making

Through this study, a question was being asked, "do social networks in an organization influence organizational decision making?" Drawn from Table 3.8, social networks in their organizations, ranging from matrix to flat organizational structures, influence organizational decisions ranging from strategic to operational. This influence on organizational decision making could be led by the organizational social network star (if one exists). With social networks influencing organizational decisions, how can this influence be illustrated? Looking at the configuration of and metrics associated with organizational social networks, this decisional influence can be better understood. As shown in Figure 3.5, multiple social networks generally exist within an organization. Through Section 3.3.8.1, the six social network metrics showed the configuration of organizational social networks depending on organizational structure or organizational decision type. Social networks across types of organizational structures showed

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similar characteristics ranging from large percentage of organizational members to strong social bonds between organizational members, as shown in Table 3.25. These characterizations demonstrate a "high" degree of cohesion in these organizational social networks. Furthermore, social networks across organizational decision types showed similar characteristics as social networks across types of organizational structures, though social networks were comprised of organizational members making similar types of decisions. This is consistent with members of organizational social networks being clustered around specific organizational levels (e.g. high degree of centralization) and having similar professional characteristics (e.g. homogeneous social network members).

> An example: In a functional organizational structure, one of the social networks in the organization is comprised of engineering or technical managers making operational decisions, and another social network in the same organization is comprised of engineering or technical managers making tactical decisions. This is further illustrated by this organization having the first social network of engineering or technical managers making operational decisions as "first level functional managers", and having the second social network of engineering or technical making tactical decisions as "the second level functional managers."

Since social networks are a part of organizations and influence organizational decision making, do these organizational social networks follow how their organizations making decisions? Drawn from Table 3.11, social networks generally adhere to the same decision making model as their parent organization. Thus, social networks are an integral aspect to and aligned with the parent organization's decision making model. Since social networks align with the organizational decision making model, how does the social network decision making model

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take shape? Drawn from Table 3.3, these organizational social networks will mostly adhere to either the Rational, Evidence-Based, or Normative decision making models. These decision making models can be used as a foundation to develop a social network decision making model, which in turn would be representative to an organizational decision making model.

3.4   Conclusion

Through the exploration of social networks and six associated social network metrics, discussed in Section 3.3, surveys of engineering or technical managers allowed the investigation of the characterization of an organizational social networks and influence of these social networks on organizational decision making. Through Section 3.3.2 to Section 3.3.7, this organizational social network characterization was developed and discussed in Section 3.3.8.1. These organizational social networks had the same composition regardless of organizational structure and decision type, with one outlier that social networks would comprise of organizational members making the same type of organizational decision. From Section 3.3.8.2, the organizational social networks generally follow the same decision making model as their parent organization, and ultimately do influence organizational decision making.

3.4.1   Future Work

Future work in researching social networks in organizational decision making involve building a social network-centric decision making model. Since social networks generally follow the same decision making model as the parent organization, determine the fit of the decision making model and evaluate the fit of this decision making model as the organizational decision making model. This evaluation would determine if a social network-centric decision making model can be representative as an organizational decision making model. In addition,

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establish where an organizational social network star(s) exists in the parent organization (based on organizational structure and decision type), and further characterize their roles in the parent organization to reveal their involvement in making organizational decisions.

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CHAPTER IV

DISSERTATION CONCLUSION

4.1   Overall Conclusion

Throughout these three studies, the relationships among organizational structures, decision types, and decision making models were explored to lead to the development of an organizational decision making model. Decision making has been represented previously by organizationally: the modern organizational theory model (Lynn, 1982) and the (Wernz, et al., 2012) model, and individually: Normative, Descriptive, Creative, Evidence-Based, and Rational. In Studies 1 and 2, the development of a decision making model was completed to progress how organizations did not adhere to decision making models (such as Normative or Evidence-Based), and construct an updated organizational decision making model. Furthermore in Study 3, social networks of organizations was explored to understand the characterization of these social networks and their impact to organizational decision making.

From Study 1, an organizational decision making model, relating to organizational structures, was developed and presented previously in Table 1.17. From Study 2, another organizational decision making model, relating to decision types, was developed and presented previously in Table 2.16. By reviewing these two organizational decision making models, these models show a high degree of similarly. This similarity is drawn from the two studies' results showing none of the five researched decision making models being representative of how an organization makes decisions (outside of primary decision types leaning towards the Rational

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decision making model). These studies' results allow an organizational decision making model

to be constructed, presented again in Table 4.1. Beyond the construction of this organizational

decision making model, Study 3 showed the characterization organizational social networks,

regardless of organizational structure and decision type, except for social networks will comprise

of members making similar decision types. Furthermore, this study showed social networks

impact organizational decision making and generally will follow the same decision making

model as the parent organization.

Table 4.1   Organizational Decision Making Model

Model Step Number	Model Step Title
1	Identify and structure the problem
2	Generate possible alternatives
3	Determine impact of alternatives
4	Identify evaluation criteria for alternatives
5	Evaluate possible alternatives
6	Choose defensible alternative

This dissertation's organizational decision making model, presented in Table 4.1, has

characteristics of the modern organizational theory model (discussed in Sections 1.1.2 and 2.1.2)

, reshown with its three steps: 1) Decision maker considers only two or three alternatives, 2)

Decision maker adopts an alternative if it satisfies certain criteria, and 3) If the alternatives fail to

satisfy the criteria, the decision maker explores additional alternatives. These two decision

making models illustrated decision making steps that included generating alternatives,

establishing evaluation criteria for these alternatives, and making a decision tied to the decision

criteria. However, this dissertation's organizational decision making model delineates additional

decision making model steps to understand the consequences of the alternative earlier in the

decision making process using that information to establish evaluation criteria, and ultimately

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leading to a chosen defensible alternative. In addition, this model does not specify a number of alternatives that needed to be generated for evaluation, and additional research can be conducted to determine an "optimal" number of alternatives, which potentially is not two or three alternatives. Lastly, this dissertation's organizational decision making model did not include any "post-decision" actions, though those actions are important to periodically evaluate the decision, but beyond the focus of an organization choosing their defensible alternative.

Ultimately, this organizational decision making model can be used a decision making model for organizational structures including matrix, functional, and divisional, and decision types including strategic, divisional, and functional.   This organizational decision making model can also be used as a foundation to how social networks within the organization make their decisions.

APPENDIX A
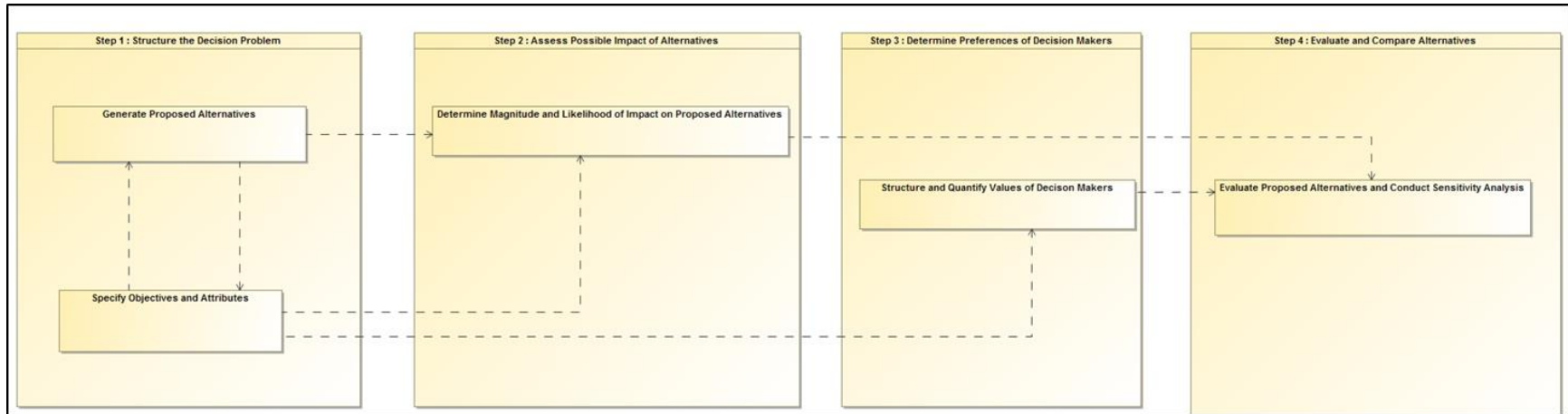
DECISION MAKING MODELS

Figure A.1   Normative Decision Model Example (Kenney, 1982)
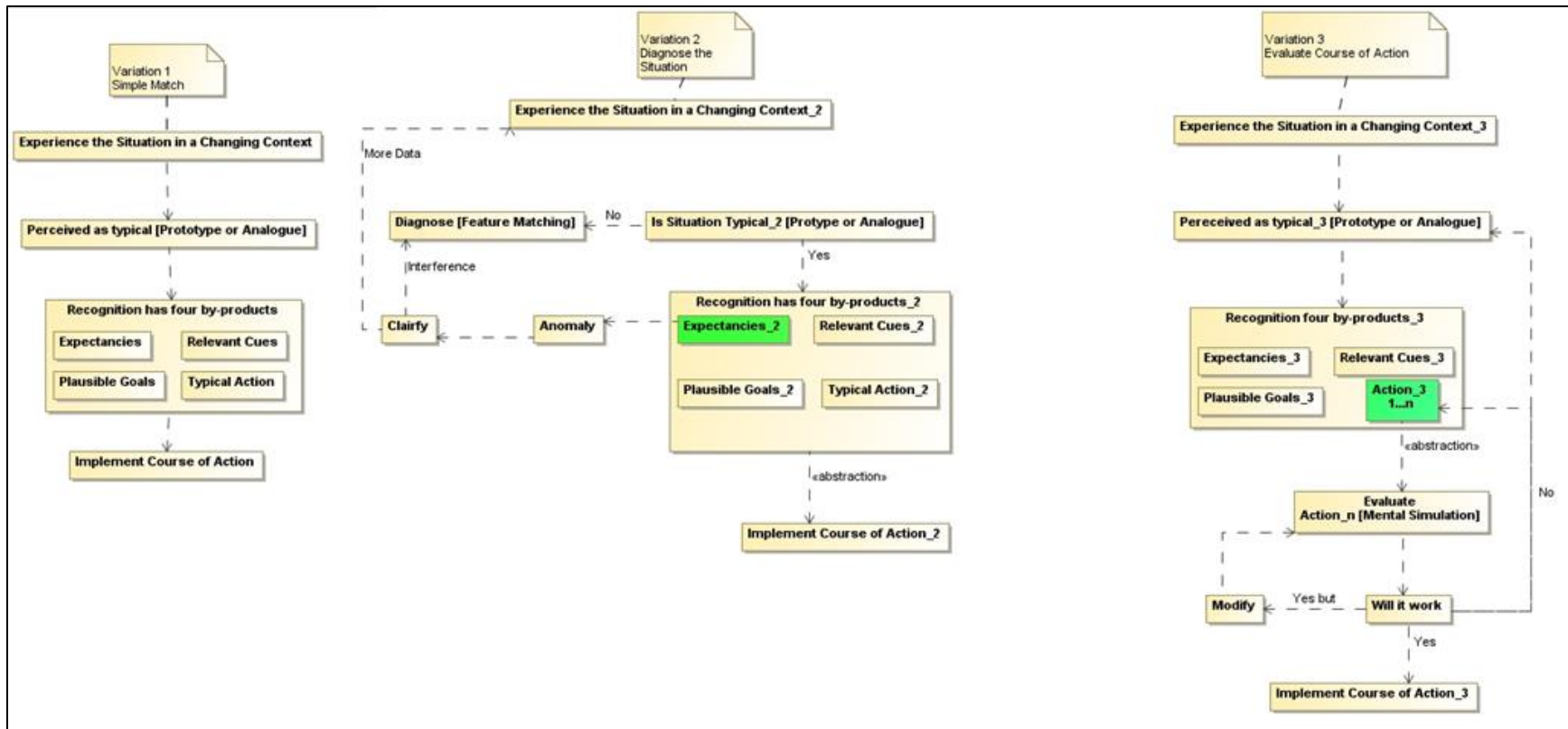
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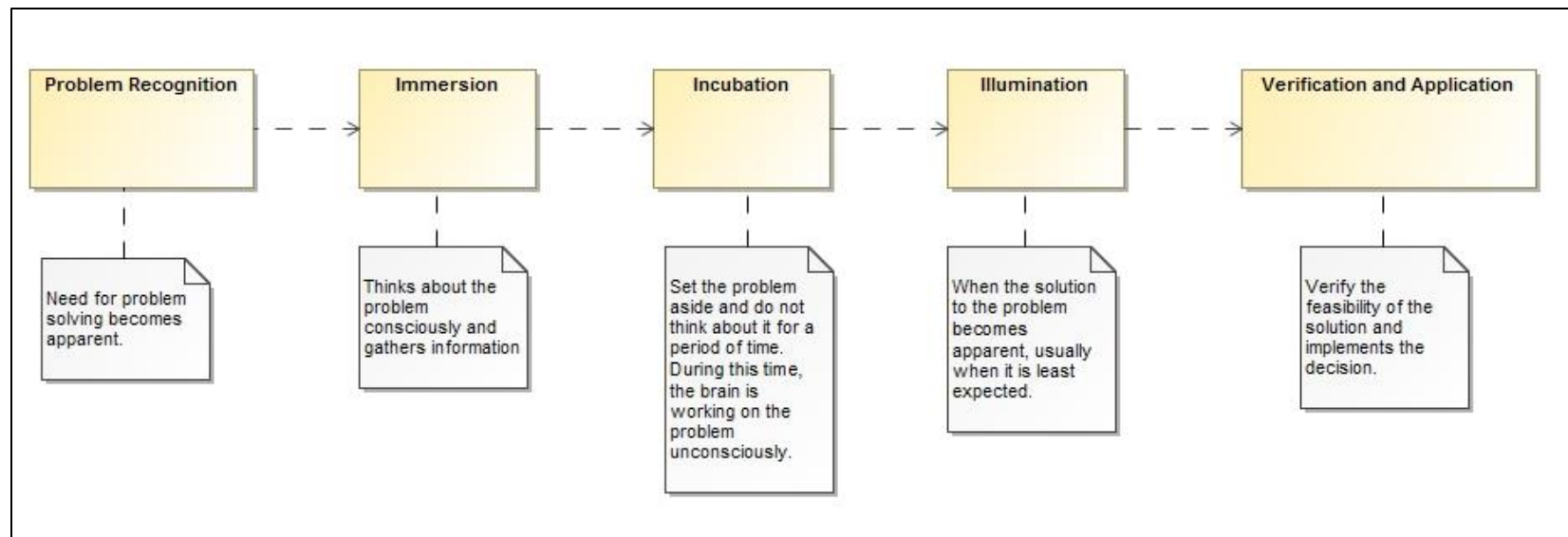Figure A.2   Recognition Prime Decision Model Example (Klein, 1998)

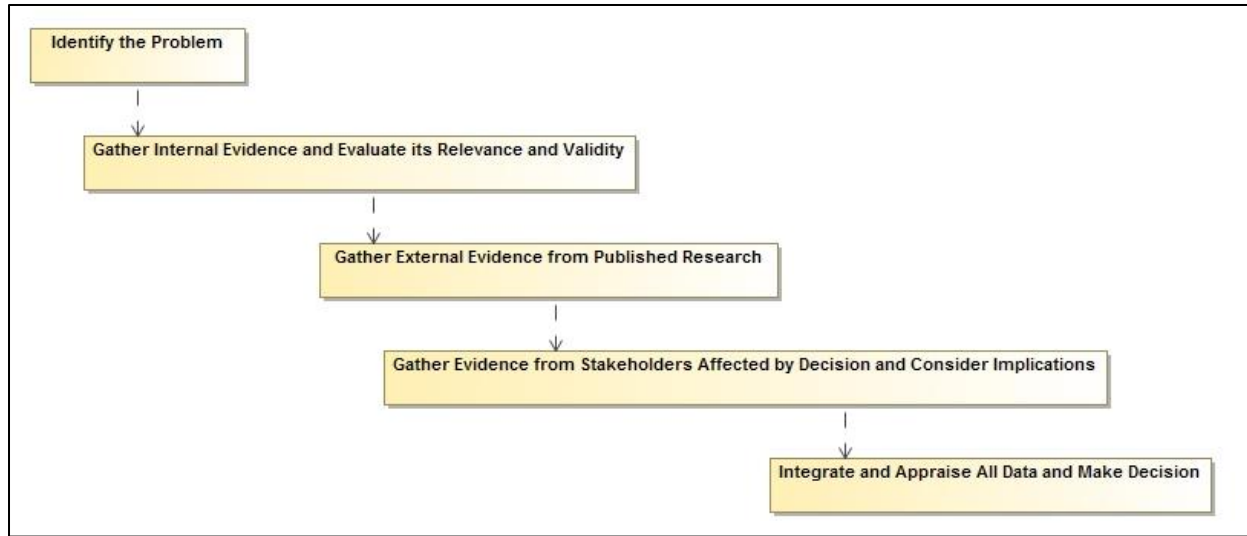Figure A.3   Creative Decision Making Model Example (Carpenter et al., 2009)

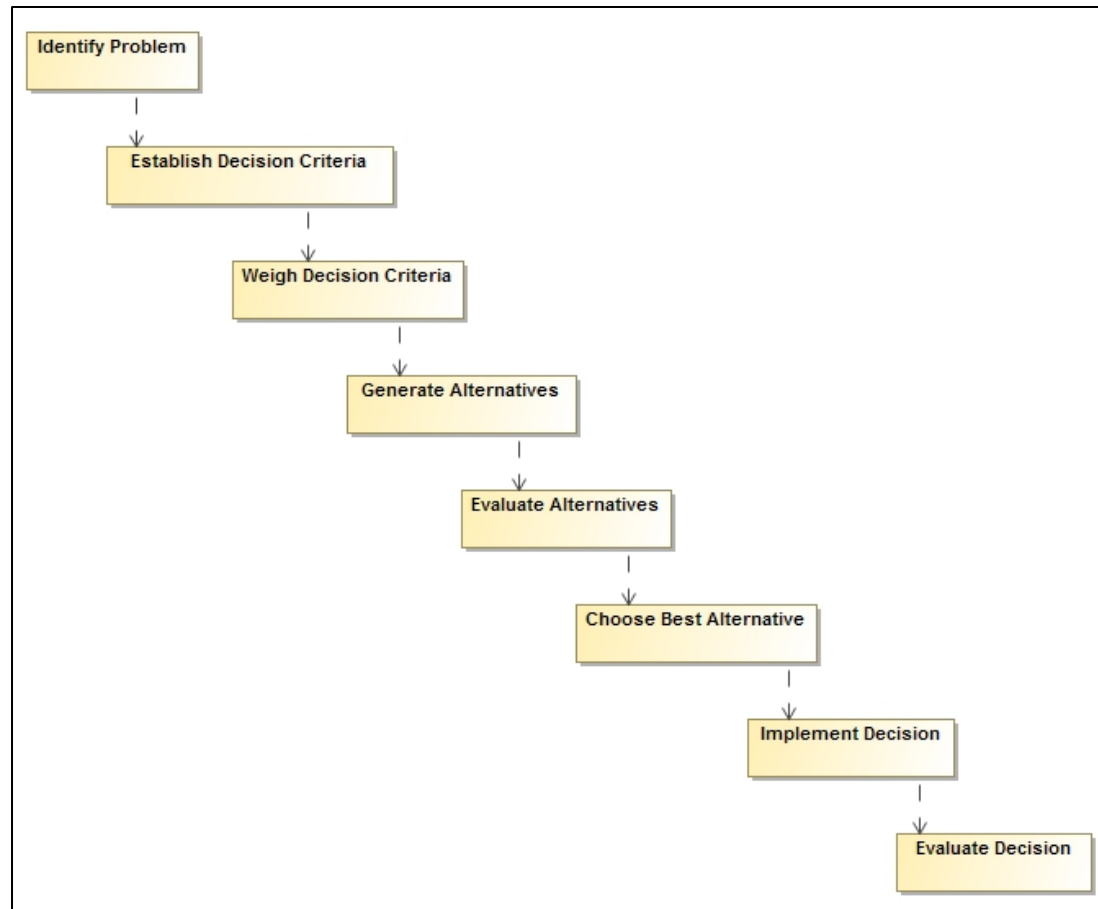Figure A.4   Evidence-Based Decision Making Model (Kreitner et al., 2012)

Figure A.5   Rational Decision Making Model (Carpenter et al., 2009)

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APPENDIX B

INTERVIEW QUESTIONNAIRES

Table B.1   Study 1 Interview Introduction Statements

Introduction Statements	Statement	Additional Information
1	Here are the five organizational structures:	
	Functional	Functional organizational structures are arranged by aligning people with similar skills into a functional area and within these functional areas, similar tasks are being performed.
	Divisional	Divisional organizational structures are arranged by people who provide similar services, who support similar clients or customers, who operate within the same processes, and who are located in same geographical area.
	Matrix	Matrix organizational structures are arranged by cross-functional teams, which integrate functional capabilities with a divisional emphasis.
	Flat	Flat organizational structures are arranged by one or few levels of management, resulting in a manager having a large number of employees under their supervision.

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Table B.1 (Continued)

	Circular	Circular organizational structures are arranged by every manager has a board comprised of the manager, their immediate supervisor, and their immediate subordinates.
2	Here is the Interview Use Case:	
	"A newly privatized national mail company needs to formulate strategies with a five year planning horizon. To date the company has been protected by legislation which allows it to operate as a monopoly on letter deliveries. This protection has engendered a culture of muddling through (i.e. minor adjustments to policies in reaction to events, with no clear sense of overall direction). However, the environment within which the company may operate in the future us likely to change fundamentally. For example, there is a possibility that it will lose its monopoly position, while technological developments pose long-term threats to the volume of letter mail. The company needs to plan its future strategy against this uncertain background. Diversification is one strategy that has been suggested	
3	Here are five decision models:	
3a	Process 1 (Normative)	
	1	Structure the decision problem
	1a	Generate proposed alternatives
	1b	Specify objectives and attributes

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Table B.1 (Continued)

	2		Assess possible impacts of each alternative
	2a		Determine magnitude and likelihood of impact on proposed alternatives
	3		Determine preferences of decision making
	3a		Structure and quantify values of decision makers
	4		Evaluate and compare alternatives
	4a		Evaluate proposed alternatives and conduct sensitivity analysis
3b	Process 2 (Descriptive)		
	1		Experience the situation in a changing context
	2		Perceived as typical
	3		Recognition
	3a		Expectancies
	3b		Relevant Cues
	3c		Plausible Goals
	3d		Typical Action
	4		Evaluate Action
	5		Implement course of action
3c	Process 3 (Creative)		
	1		Problem recognition
	2		Immersion

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Table B.1 (Continued)

	3	Incubation
	4	Illumination
3d	5	Verification and Application
	Process 4 (Evidence-Based)	
	1	Identify the problem
	2	Gather internal evidence and evaluate its relevance and validity
	3	Gather external evidence from published research
	4	Gather evidence from stakeholders affected by decision and consider implications
	5	Integrate and appraise all data and make decision
3e	Process 5 (Rational)	
	1	Identify problem
	2	Establish decision criteria
	3	Weigh decision criteria
	4	Generate alternatives
	5	Evaluate alternatives
	6	Choose best alternative
	7	Implement decision
	8	Evaluate decision

Table B.2   Study 1 Interview Questions

Question Number	Question	Amplifying Information	Response
1	Name your organizational title/position		
2	Which of these five organizational structure characterizes your organization?		Functional / Divisional / Matrix / Flat / Circular
3	Characterize your relationship to each process step by one of the following: strong, moderate, weak, and none.		
		Strong - Decision model is used by your organization to make a decision	
		Moderate - Aspects of the decision model step is used by your organization to make a decision	
		Weak - Limited connection to decision model step and your organization	
		None - No relationship exists between decision model step and your organization	
3a	Characterize Process 1 (Normative)		
	Structure the decision problem	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Generate proposed alternatives	Propose a specified number of strategies to support growth for the company during a five year period.	

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Table B.2 (Continued)

	Specify objectives and attributes	Select an objective(s) for the company's strategies such as 25% growth in the company's business during the next five years. Select alternative attributes such as how much diversification in the company's products.	
	Assess possible impacts of each alternative	Identify impacts of the proposed strategies on reaching the company's objectives.	
	Determine magnitude and likelihood of impact on proposed alternatives	Based on an impact, what is the magnitude (e.g. in terms of severity - low, medium, high) and likelihood (e.g. in terms of occurrence - unlikely, likely, near certainty) on proposed strategies in reaching the company's objective(s)?	
	Determine preferences of decision making	What attributes of the proposed strategies are being used to determine the "best" strategy to realize the company's objective(s)?	
	Structure and quantify values of decision makers	Structure the evaluation criteria of the strategy attributes and how the company's decision makers will evaluate these proposed strategies.	

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Table B.2 (Continued)

	Evaluate and compare alternatives	Company decision makers will evaluate proposed strategies and compare these alternatives based on selected strategy attributes	
	Evaluate proposed alternatives and conduct sensitivity analysis	Company decision makers will evaluate proposed strategies and conduct sensitivity analysis on proposed strategies and associated attributes to select the "best" strategy with a five year horizon to reach the company's objective(s).	
3b	Characterize Process 2 (Descriptive)		
	Experience the situation in a changing context	Due to the transition of the company, what is the future of this newly restructured company?	
	Perceived as typical	Is the selection of a planning strategy typical of this company?	
	Recognition	What are possible strategies?	
	Expectancies	What are the expectations of this planning strategy?	
	Relevant Cues	What are prompts to select a possible planning strategy?	
	Plausible Goals	What are the outcomes of implementing a planning strategy?	
	Typical Action	Select a planning strategy.	
	Evaluate Action	Evaluate the selected planning strategy.	
	Implement course of action	Implement the planning strategy.	
3c	Characterize Process 3 (Creative)		

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Table B.2 (Continued)

	Problem recognition	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Immersion	What could be possible strategies to support growth in the mail company? What criteria is important for the company to consider?	
	Incubation	Company sets aside the five year planning strategy planning. Executes immediate transition from government to privatize company.	
	Illumination	During the transition execution period, company realizes strategy to use for their five year planning.	
	Verification and Application	Company evaluates chosen strategy against identified criteria and starts implementing the strategy.	
3d	Characterize Process 4 (Evidence-Based)		
	Identify the problem	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Gather internal evidence and evaluate its relevance and validity	Gathers internal company data from previous years and determines if this data can be leveraged to support future planning.	
	Gather external evidence from published research	Gathers available data from other mail companies to support the evaluation of possible strategies.	

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Table B.2 (Continued)

	Gather evidence from stakeholders affected by decision and consider implications	Gather data from employees, board of directors and consider the impacts of possible strategies on these groups.	
	Integrate and appraise all data and make decision	Merge the data from the different sources and analyze this data against criteria to determine the five year planning strategy.	
3e	Characterize Process 5 (Rational)		
	Identify problem	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Establish decision criteria	Select criteria for the company's strategies such as how much growth does the company want during the next five years.	
	Weigh decision criteria	Prioritize the selected decision criteria.	
	Generate alternatives	Generate a number of possible planning strategies.	
	Evaluate alternatives	Evaluate the proposed planning strategies against the decision criteria.	
	Choose best alternative	Select the alternative based on which one bests meets the prioritized decision criteria.	
	Implement decision	Execute planning strategy.	
	Evaluate decision	Evaluate strategy periodically to see if this strategy is meeting your criteria.	
4	Do you have any additional comments?		

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Table B.3   Study 2 Interview Introduction Statements

Introduction Statements	Statement	Additional Information
1	Here are the five organizational structures:	
	Functional 	Functional organizational structures are arranged by aligning people with similar skills into a functional area and within these functional areas, similar tasks are being performed.
	Divisional 	Divisional organizational structures are arranged by people who provide similar services, who support similar clients or customers, who operate within the same processes, and who are located in same geographical area.
	Matrix 	Matrix organizational structures are arranged by cross-functional teams, which integrate functional capabilities with a divisional emphasis.
	Flat 	Flat organizational structures are arranged by one or few levels of management, resulting in a manager having a large number of employees under their supervision.
	Circular 	Circular organizational structures are arranged by every manager has a board comprised of the manager, their immediate supervisor, and their immediate subordinates.

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Table B.3 (Continued)

2	Here is the Survey Use Case:	
	"A newly privatized national mail company needs to formulate strategies with a five year planning horizon. To date the company has been protected by legislation which allows it to operate as a monopoly on letter deliveries. This protection has engendered a culture of muddling through (i.e. minor adjustments to policies in reaction to events, with no clear sense of overall direction). However, the environment within which the company may operate in the future us likely to change fundamentally. For example, there is a possibility that it will lose its monopoly position, while technological developments pose long-term threats to the volume of letter mail. The company needs to plan its future strategy against this uncertain background. Diversification is one strategy that has been suggested	
3	Here are five decision models:	
3a	Process 1 (Normative)	
	1	Structure the decision problem
	1a	Generate proposed alternatives
	1b	Specify objectives and attributes
	2	Assess possible impacts of each alternative
	2a	Determine magnitude and likelihood of impact on proposed alternatives
	3	Determine preferences of decision making
	3a	Structure and quantify values of decision makers
	4	Evaluate and compare alternatives
	4a	Evaluate proposed alternatives and conduct sensitivity analysis
3b	Process 2 (Descriptive)	
	1	Experience the situation in a changing context
	2	Perceived as typical
	3	Recognition
	3a	Expectancies

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Table B.3 (Continued)

		3b	Relevant Cues
		3c	Plausible Goals
		3d	Typical Action
		4	Evaluate Action
		5	Implement course of action
3c	Process 3 (Creative)		
		1	Problem recognition
		2	Immersion
		3	Incubation
		4	Illumination
3d		5	Verification and Application
	Process 4 (Evidence-Based)		
		1	Identify the problem
		2	Gather internal evidence and evaluate its relevance and validity
		3	Gather external evidence from published research
		4	Gather evidence from stakeholders affected by decision and consider implications
		5	Integrate and appraise all data and make decision
3e	Process 5 (Rational)		
		1	Identify problem
		2	Establish decision criteria
		3	Weigh decision criteria
		4	Generate alternatives
		5	Evaluate alternatives
		6	Choose best alternative
		7	Implement decision
		8	Evaluate decision
4	Here are the decision type definitions:		

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Table B.3 (Continued)

4a	Strategic: Strategic decisions can be framed by having an impact on an organization's direction and scope over a long period to achieve a potential advantage in a changing environment through the management of resources and competences to satisfy stakeholder expectations.	Example Questions: Should we merge with another company?; Should we pursue a new product line?; Should we restructure the organization?
4b	Tactical: Tactical decisions are impacted by the outcomes from the organization's strategic decisions with characteristics such as a medium term organization time scale and organizational scope.	Example Questions: What should we do to help facilitate employees from the two groups working together?; How should we market the new product line?; Who should we hire or "let go" if we restructure the organization?
4c	Operational: Operational decisions are impacted by the outcomes from the organization's strategic and tactical decisions. Operational decisions can be broken down into several characteristics including: Short term organization direction: impact of decision will be a short time scale such as daily activities; Organizational resources: small scale impact on the organizational resources affected by this decision type; and Established organizational scope: activities associated with this decision type will be repetitive, and will generally have established objectives based on the organizational strategic and tactical decisions.	Example Questions: How often should I communicate with my new team members?; What should I say to customers about our new product?; How do I balance my demands between projects?

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Table B.4   Study 2 Interview Questions

Question Number	Question	Amplifying Information	Response
1	Name your organizational title/position		
2	Which of these five organizational structure characterizes your organization?		Functional / Divisional / Matrix / Flat / Circular
3	What type of decision(s) do you make in your position?		Strategic/Tactical/Operational
3a	What is your primary decision type for your position?		Strategic/Tactical/Operational
4	Characterize your relationship to each process step by one of the following: strong, moderate, weak, and none.		
		Strong - Decision model step is used to make the type of decision	
		Moderate - Aspects of the decision model step is used to make the type of decision	
		Weak - Limited connection to decision model step and decision type	
		None - No relationship exists between decision model step and making the type of decision	
4a	Characterize Process 1 (Normative)		
	Structure the decision problem	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Generate proposed alternatives	Propose a specified number of strategies to support growth for the company during a five year period.	

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Table B.4 (continued)

	Specify objectives and attributes	Select an objective(s) for the company's strategies such as 25% growth in the company's business during the next five years. Select alternative attributes such as how much diversification in the company's products.	
	Assess possible impacts of each alternative	Identify impacts of the proposed strategies on reaching the company's objectives.	
	Determine magnitude and likelihood of impact on proposed alternatives	Based on an impact, what is the magnitude (e.g. in terms of severity - low, medium, high) and likelihood (e.g. in terms of occurrence - unlikely, likely, near certainty) on proposed strategies in reaching the company's objective(s)?	
	Determine preferences of decision making	What attributes of the proposed strategies are being used to determine the "best" strategy to realize the company's objective(s)?	
	Structure and quantify values of decision makers	Structure the evaluation criteria of the strategy attributes and how the company's decision makers will evaluate these proposed strategies.	
	Evaluate and compare alternatives	Company decision makers will evaluate proposed strategies and compare these alternatives based on selected strategy attributes	
	Evaluate proposed alternatives and conduct sensitivity analysis	Company decision makers will evaluate proposed strategies and conduct sensitivity analysis on proposed strategies and associated attributes to select the "best" strategy with a five year horizon to reach the company's objective(s).	
4b	Characterize Process 2 (Descriptive)		

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Table B.4 (Continued)

	Experience the situation in a changing context	Due to the transition of the company, what is the future of this newly restructured company?	
	Perceived as typical	Is the selection of a planning strategy typical of this company?	
	Recognition	What are possible strategies?	
	Expectancies	What are the expectations of this planning strategy?	
	Relevant Cues	What are prompts to select a possible planning strategy?	
	Plausible Goals	What are the outcomes of implementing a planning strategy?	
	Typical Action	Select a planning strategy.	
	Evaluate Action	Evaluate the selected planning strategy.	
	Implement course of action	Implement the planning strategy.	
4c	Characterize Process 3 (Creative)		
	Problem recognition	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Immersion	What could be possible strategies to support growth in the mail company? What criteria is important for the company to consider?	
	Incubation	Company sets aside the five year planning strategy planning. Executes immediate transition from government to privatize company.	
	Illumination	During the transition execution period, company realizes strategy to use for their five year planning.	
	Verification and Application	Company evaluates chosen strategy against identified criteria and starts implementing the strategy.	

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Table B.4 (Continued)

4d	Characterize Process 4 (Evidence-Based)		
	Identify the problem	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Gather internal evidence and evaluate its relevance and validity	Gathers internal company data from previous years and determines if this data can be leveraged to support future planning.	
	Gather external evidence from published research	Gathers available data from other mail companies to support the evaluation of possible strategies.	
	Gather evidence from stakeholders affected by decision and consider implications	Gather data from employees, board of directors and consider the impacts of possible strategies on these groups.	
	Integrate and appraise all data and make decision	Merge the data from the different sources and analyze this data against criteria to determine the five year planning strategy.	
4e	Characterize Process 5 (Rational)		
	Identify problem	Develop strategies with a five year planning horizon allowing growth for newly privatized mail company.	
	Establish decision criteria	Select criteria for the company's strategies such as how much growth does the company want during the next five years.	
	Weigh decision criteria	Prioritize the selected decision criteria.	
	Generate alternatives	Generate a number of possible planning strategies.	
	Evaluate alternatives	Evaluate the proposed planning strategies against the decision criteria.	

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Table B.4 (Continued)

	Choose best alternative	Select the alternative based on which one bests meets the prioritized decision criteria.	
	Implement decision	Execute planning strategy.	
	Evaluate decision	Evaluate strategy periodically to see if this strategy is meeting your criteria.	
5	Do you have any additional comments?		

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APPENDIX C

INTERVIEW READ-AHEAD MATERIAL

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C.1   Read-Ahead Material Introduction

The following presentation was provided to interviewees to review before the interview and use as a reference during the interview.

Introduction

▸ This presentation will serve as introduction to background material for an interview about organizational decision making.

▸ The interview will include questions about decision models and decision types to characterize relationships between decision models and organizational structures, and between decision models and decision types.

▸ Review this presentation before the scheduled interview date.

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APPENDIX D

SURVEY QUESTIONNAIRE

The following survey questionnaire was used in Qualtrics integrated with Amazon Mechanical Turk as discussed in Section 3.2.

Please read the following informed consent form and if you would like to participate in this survey, indicate your consent by continuing with the survey.

Title of Study: Developing an Organizational Decision Making Model: The Impact of Organizational Structures, Decision Types, and the Social Network

Researchers: Mr. John Huggins, Dr. Lesley Strawderman, Dr. Brian Smith, Dr. Reuben Burch and Dr. Stan Bullington

Purpose: The purpose of this study is to investigate how organizations make decisions to include how social networks impact organizational decision making.

Procedures: If you agree to participate, your participation will be for approximately 15 mins. You will be given a survey that will have four introduction statements to review, then will ask you 20 items on decision making and social networks at your organization.

Benefits: There will be no direct educational or health benefits to you for participating in this research.

Risks: This is a survey study. There is no possibilities for risk or harm to participants as a result of participation in the study.

Confidentiality: Individual identifies will be protected and all participant responses will be kept confidential. All the data collection process will be anonymous and all the data will be kept in PI's office and locked.

Compensation: You will receive compensation upon completing this study from Amazon Mechanical Turk. No payment will be made for an incomplete survey.

Questions: If you have any questions about this research project, please feel free to contact Mr.John Huggins at jhh226@msstate.edu

Voluntary Participation: Please understand that your participation is voluntary. Your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue your participation at any time, however, we will not be able to pay you for an incomplete survey.   Please take all the time you need to read through this document and decide whether you would like to participate in this research study.   By entering the survey area, you indicate that you are at least 18 years old and are giving your informed consent to participate in this study. If you would like to print a copy of this document, please use the "print" function on your internet browser.

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Q1 Are you an engineering or technical manager?

◯ Yes (1)

◯ No (2)

Q2 Name your Organizational Title/Position

_____

Review information on these four organizational structures:

Functional:
Functional organizational structures are arranged by aligning people with similar skills   into a functional area and within these functional areas, similar tasks are being performed.

Divisional:
Divisional organizational structures are arranged by people who provide similar services, who support similar clients or customers, who operate within the   same processes, and who are located in same geographical area.

Matrix:
Matrix organizational structures are arranged by cross-functional teams, which integrate functional capabilities with a divisional emphasis.

Flat:
Flat organizational structures are arranged by one or few levels of management, resulting in a manager having a large number of employees under their supervision.

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Q3 Which of these four organizational structure best characterizes your organization?

$\bigcirc$ Functional (1)

$\bigcirc$ Divisional (2)

$\bigcirc$ Matrix (3)

$\bigcirc$ Flat (4)

Review information on these five decision models:

Process 1:

 1   Structure the decision problem

1a   Generate proposed alternatives

1b   Specify objectives and attributes

2   Assess possible impacts of each alternative

2a   Determine magnitude and likelihood of impact on proposed alternatives

3   Determine preferences of decision making

3a   Structure and quantify values of decision makers

4   Evaluate and compare alternatives

4a   Evaluate proposed alternatives and conduct sensitivity analysis

---

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Process 2:

1 Experience the situation in a   changing context

2 Situation perceived as typical

3 Situation Recognition

3a Expectancies of situation

3b   Relevant Cues of situation

3c Plausible Goals of situation

3d Typical Action for situation

4 Evaluate Action

5 Implement course of action

Process 3:

1 Problem recognition

2 Immersion

3 Incubation

4 Illumination

5 Verification and   Application

Process 4:

1 Identify the problem

2 Gather internal evidence and evaluate its relevance and validity

3 Gather external evidence from published research

4 Gather evidence from   stakeholders affected by decision and consider implications

5 Integrate and appraise all data and make decision

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Process 5:

1 Identify problem

2 Establish decision criteria

3 Weigh decision criteria

4 Generate alternatives

5 Evaluate alternatives

6 Choose best alternative

7 Implement decision

8 Evaluate decision

Q4 Which of the five decision models best fits how your organization makes decisions?

○ Process 1 (1)

○ Process 2 (2)

○ Process 3 (3)

○ Process 4 (4)

○ Process 5 (5)

Q5 Choose a decision step(s) from one of the five decision models that your organization strongly adheres to.

Example: Process 1 Step 1 (Structure the decision problem)

_____

Review   information on these three decision type definitions:

Strategic:
Strategic decisions can be framed by having an impact on an organization's direction and scope over a long period to achieve a potential advantage in a changing environment through the management of resources and competences to satisfy stakeholder expectations.

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Examples: Should we merge with another company?; Should we pursue a new product line?; Should we restructure the organization?

Tactical:

Tactical decisions are impacted by the outcomes from the organization's strategic decisions with characteristics such as a medium term organization time scale and organizational scope.

Examples: What should we do to help facilitate employees from the two groups working together?; How should we market the new product line?; Who should we hire or "let go" if we restructure the organization?

Operational:

Operational decisions are impacted by the outcomes from the organization's strategic and tactical decisions. Operational decisions can be broken down into several characteristics including: Short term organization direction: impact of decision will be a short time scale such as daily activities; Organizational resources: small scale impact on the organizational resources affected by this decision type; and Established organizational scope: activities associated with this decision type will be repetitive, and will generally have established objectives based on the organizational strategic and tactical decisions.

Examples: How often should I communicate with my new team members?; What should I say to customers about our new product?; How do I balance my demands between projects?

Q6 What type of decision(s) do you make in your position?

☐ Strategic (1)

☐ Tactical (2)

☐ Operational (3)

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Q6A What is your primary decision type for your position?

○ Strategic (1)

○ Tactical (2)

○ Operational (3)

Review this description about social networks.

Social groups exist within any organization and will rapidly self-organize into networks, though the establishment of these social networks will be influenced by the organizational structure type (e.g. matrix, functional, etc.). Within a social network, the members will be ranked based on their power, influence or dominance exhibited, thus members could be superior or subordinate to other members within the social group. This social network standing may not entirely align with the established organizational structure member roles (e.g. an organizational member, who is not an manager or supervisor, may have more influence in the social network than the influence assigned to their organizational role).

Q7
Describe the social networks in your organization.
Example: are social networks aligned with the organizational structure, peer groups, or in some other way? Are there multiple social networks within the organization?

_____

Q8
Please rate your level of agreement with the following statement:

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Your organization has a large number of people (in comparison with the organizational size) associated with the social network.

   ○ Strongly agree (1)

   ○ Agree (2)

   ○ Neither agree nor disagree (3)

   ○ Disagree (4)

   ○ Strongly disagree (5)

Q9 Please rate your level of agreement with the following statement:

The social network clusters around a specific organizational level/group within the organization.

   ○ Strongly agree (1)

   ○ Agree (2)

   ○ Neither agree nor disagree (3)

   ○ Disagree (4)

   ○ Strongly disagree (5)

Q9A If agree or strongly agree, please state at which organizational level (examples: executive, division, branch)

_____

Q10 Please rate your level of agreement with the following statement:

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The social network is comprised of a similar type of organizational member (e.g. all members are supervisors).

○ Strongly agree (1)

○ Agree (2)

○ Neither agree nor disagree (3)

○ Disagree (4)

○ Strongly disagree (5)

Q11 Is there a particular professional characteristic which all social network members have (e.g. all social network members are engineers)?

_____

Q12 Please rate your level of agreement with the following statement:

There is a strong social connection between all members of the organizational social network.

○ Strongly agree (1)

○ Agree (2)

○ Neither agree nor disagree (3)

○ Disagree (4)

○ Strongly disagree (5)

Q13 Please rate your level of agreement with the following statement:

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All members of the organizational social network are at the same physical site (e.g. all work on the same campus or office complex).

    ◯ Strongly agree (1)

    ◯ Agree (2)

    ◯ Neither agree nor disagree (3)

    ◯ Disagree (4)

    ◯ Strongly disagree (5)

Q14 Do decisions made by the social network follow the same decision model as the overall organization?

    ◯ Yes (1)

    ◯ No (2)

Q14A If not, which decision model best characterizes how the social network makes decisions? The processes are listed after this question as a reference.

    ◯ Process 1 (1)

    ◯ Process 2 (2)

    ◯ Process 3 (3)

    ◯ Process 4 (4)

    ◯ Process 5 (5)

Process 1:

1   Structure the decision problem

1a   Generate proposed alternatives

1b   Specify objectives and   attributes

2   Assess possible impacts of each alternative

2a   Determine magnitude and likelihood of impact on proposed alternatives

3   Determine preferences of decision making

3a   Structure and quantify values of decision makers

4   Evaluate and compare alternatives

4a   Evaluate proposed alternatives and conduct sensitivity analysis

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Process 2:

1   Experience the situation in a changing context

2   Situation perceived as typical

3   Situation Recognition

3a   Expectancies of situation

3b   Relevant Cues of situation

3c   Plausible Goals of situation

3d   Typical Action for situation

4   Evaluate Action

5   Implement course of action

Process 3:

1   Problem recognition

2   Immersion

3   Incubation

4   Illumination

5   Verification and   Application

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Process 4:
1 Identify the problem

2 Gather internal evidence and evaluate its relevance and validity

3 Gather external evidence from published research

4 Gather evidence from stakeholders affected by decision and consider implications

5 Integrate and appraise all data and make decision

Process 5:
1 Identify problem

2 Establish decision criteria

3 Weigh decision criteria

4 Generate alternatives

5 Evaluate alternatives

6 Choose best alternative

7 Implement decision

8 Evaluate decision

Q15 Please rate your level of agreement with the following statement:

Decisions made by the social network impact decisions made by the organization.

○ Strongly agree (1)

○ Agree (2)

○ Neither agree nor disagree (3)

○ Disagree (4)

○ Strongly disagree (5)

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Q15A If agree or strongly agree, please state what types of organizational decision?

☐ Strategic (1)

☐ Tactical (2)

☐ Operational (3)

Q16 Do you have any additional comments?

_____

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