The Application of Game Theory to Incentives for Innovation in Modern Business

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## Abbreviations

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<tr>
<td>PARTS</td>
<td>Player, Added value, Rules, Tactics, Scope</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>SME</td>
<td>Small and Medium Enterprise</td>
</tr>
<tr>
<td>RBV</td>
<td>Resource Based View</td>
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<td>QUAL</td>
<td>Qualitative</td>
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Abstract

This thesis reports on a research project investigating the application of game theory to incentives for innovation in modern business. The overall aim of this study is to build a conceptual framework, from the strategic management perspective, for the application of incentives for innovation in order to respond to signals that there is a need to innovate. Game theory is applied as a framework for the analysis of interactions between companies and identification of how the incentives for innovation arise.

The research questions of this study are: What signals the need for innovation? How do the incentives for innovation arise? What are the potential problems of changing the game through innovation? The inductive research approach is employed for the study. Starting from case studies (n=6), an initial insight for the direction of the study was provided, from which the base of semi-structured interviews (n=12) was established. The semi-structured interview further investigated and explored the issues discovered in the case study, and the results were validated by a questionnaire survey (n=119).

The original contributions to knowledge are: the signals pointing to the need for innovation are identified; the situations where the incentives for innovation can arise are investigated. Barriers and difficulties that a company may encounter while trying to innovate are discussed, and cooperation in innovation is suggested as a way to remove the barriers and restore the incentive for innovation. A predictive model based on the conceptual framework built from this study is recommended for further research.
Declaration

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Acknowledgements

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I would like to thank everyone who participated in this research and generously gave up their time for interview, and all those people who completed the questionnaires.

Finally, I wish to express my greatest appreciation to my family and friends who have always stood by me and given me their love and support.
Chapter 1: Introduction

Brief

This chapter introduces this thesis by:

• Stating the problems on the topic and motives for this research in section 1.1.
• Identifying the aim of this research and listing the objectives of this thesis in section 1.2.
• Listing the research questions this thesis seeks to answer in section 1.3.
1.1 Problem Statement

In 1944, John von Neumann and Oskar Morgenstern published *Theory of Games and Economic Behaviour*. Since then, in the past fifty years, game theory has gradually become standard language in economics and is increasingly used in other social sciences ranging from politics (Brams, 2005) and computer science (Nisan, 2007) to business strategy (Brandenburger & Nalebuff, 1996) and even to biology (Barash, 2003).

The strength of game theory is that it can incorporate interdependence into the analysis and can cope, up to a certain point, with uncertainty and asymmetries (Hargreaves-Heap & Varoufakis, 1995). Game theory as a tool of analysis, enables the explicit investigation of companies’ interactions. It provides a framework for understanding the behaviour of players in situations where profit-maximising companies have to decide their conduct whilst knowing that the decisions made by any one of them significantly influences the market possibilities facing their competitors (von Neumann & Morgenstern, 2007). It is a situation faced by many companies when they have to decide whether or not to engage in innovation.

Innovation, one of the most important concepts in modern business, has been widely developed by several different schools of thought during the past two decades. For instance, the market-based view, whose advocates include Slater and Narver (1994), and Porter (1985), and also the resource-based view, whose advocates include Prahalad and Hamel (1990), Barney (1991) and Grant (1996). Moreover, the functions in innovation have also been
recognised for their potential to allow the company to gain strategic advantages (Hall, 1994; Pitt & Clarke, 1999).

As suggested by Schumpeter (1962), the competition of the new technology, the new product, the new source of supply and the new type of organisation is the competition that is much more effective in terms of changing the trend in the market. Innovation is critical, not only for those who wish to accelerate or sustain the rate of growth, but also for those who wish to change the direction of economic advance (Freeman, 1982). Creativity and innovation are now the essential elements in every business strategy, irrespective of whether the industry in which the business operates is young and growing or mature and established.

The game theory framework has been applied to analyse the conditions and incentives for companies to engage in innovative R&D co-operation in the field of new industrial economics since the early 1980s. In either non-tournament models, where companies are engaged in a Cournot (competing on output quantity), or Bertrand (competing on price) competition and continuous innovation (D’Aspremont & Jacquemin, 1988) or a patent race (Katsoulacos, 1988), collaboration in innovative R&D seems to improve the performance of companies as well as social welfare in a situation where technological appropriate is low and technological spillover has reduced the incentives for companies to invest in an expensive R&D innovation process (Pyka, 2002). Von Hippel (1989) also applied the prisoner-dilemma model to the empirical phenomenon of free know-how exchange between companies, known as informal know-how trading.
However, the existing studies regarding game theory applied to incentives for innovation are mainly concentrated on one perspective of innovation: technical R&D, and on one particular type of innovation: product innovation. Incentives for cooperation in innovation are studied and suggested to be more efficient and more effective, but in comparison there are much fewer studies that discuss the incentives for innovation in the non-cooperative game.

Therefore, despite the importance of both concepts for modern business, during research of the literature, there were only a few sources found that applied game theory to incentives for innovation to some extent. No proper model was found for applying the game theory framework to identify incentives for innovation for companies. There are no clear answers to questions such as, what are the incentives for innovation? and when do the incentives that drive a company to innovate arise?, and also, how could a company use innovation to change the game of business?

The problems can therefore be summarised as follows:

- Current research only focuses on the R&D process and technological innovations;
- The incentives for innovation in the non-cooperative game are not clear;
- The situations where the incentives for innovation would arise are not clear;
- How innovation could be used as a method of game changing is not clear.
1.2 Aim and Objectives

This research can be summarised under an overall aim and measurable objectives.

The overall aim of this study is to build a conceptual framework, from the strategic management perspective, for the application of incentives for innovation in order to respond to signals that there is a need to innovate. Game theory is applied as a framework for the analysis of the interactions between companies and identification of how the incentives for innovation arise.

In order to achieve this purpose, the objectives of this research are:

1. To review the existing studies on game theory and its application in practice for identifying the suitable framework to apply to this study.

2. To evaluate innovation management from a market-based view, resource-based view and knowledge-based view. To review the function of innovation from a strategic management perspective.

3. To identify signals that give early warnings/hints for companies that there are needs to innovate through the use of case studies, interviews and surveys.

4. To identify the incentives for innovation and the situations where these incentives would arise with the application of a game theoretic concept through the use of case studies, interviews and surveys.
5. To identify the possible disincentives that may hinder companies’ innovation and issues that they may encounter when innovating.
1.3 Research Questions

1. What are the signals for companies to innovate?

2. What are the incentives that could encourage a company to engage in innovation?

3. How do the incentives for innovation arise?
   - What are the strategic functions of innovation?

4. What are the potential difficulties of changing the game of business through innovation?
   - What are the barriers that may hinder companies' innovation?
   - What are the problems that companies may encounter when employing innovation to change the game of business?
Chapter 2: Literature Review

Brief

The overall aim of this chapter is to introduce the relevant literature that is relevant to this research, as well as to identify the existing gaps on the topic. The measurable objectives for the chapter are as follows:

- To provide a critique of game theory and its suitability for practical business application in part one of chapter two.
- To evaluate innovation management and explore its strategic application in part two of chapter two.
- To discuss the existing studies on game theory applied to incentives for innovation in part three of chapter two.
- To identify the gaps between application of game theory and innovation management in section 2.3.
- To outline and discuss the relevant subjects to the study in section 2.4.
- To list and introduce the publications relevant to the research in section 2.5.

By introducing the relevant literature, this chapter hopes to obtain a comprehensive understanding of the background knowledge of the topic.
2.1 Introduction and Background

To begin the search for relevant literature, a list of keywords/phrases that are likely to help identify useful resources was drawn up. Initially, the keywords were “game theory and innovation”, “incentives for innovation”, “game theory applied to business”, and finally “innovation and business”. As the research progressed, the list of keywords expanded. New keywords included “change the game”, “blue ocean strategy and innovation”, “temporary monopoly and innovation”, “strategic management and innovation”, and also “resource based view and innovation”. To collect useful resources, keywords were used to search through online databases including Emerald, Informaworld, Sage Journals online, JSTOR, Google and The University of Manchester library catalogue.

Whilst cross searching through the keywords identified above, several useful concepts such as “blue ocean strategy”, “temporary monopoly”, and “behavioural game theory” were found. This led to more publications that were useful for the research. However, throughout the search, a large body of mathematically based game theory studies were found, which is not an objective that this study wishes to work towards. A gap between the application of game theory and innovation from a strategic management perspective has been found.

Appendix 1 is the literature map that shows the existing studies that are relevant to this research.
2.2 Existing Literature on Game Theory and Innovation Management

Part One: Application of Game Theory

2.2.1 Introduction to Game Theory

Game theory is a theory that deals with the situation when one individual's actions depend on what other individuals may do. It is concerned with how several individuals make decisions when they are aware that their actions affect others and when each individual takes this into account (Bierman & Fernandez, 1993).

Many of the key features of game theory were introduced by von Neumann and Morgenstern. It all began in 1944, when Neumann and Morgenstern published *Theory of Games and Economic Behaviour*. Since then, in the past fifty years, game theory has gradually become standard language in economics and is increasingly used in other social sciences ranging from politics (Brams, 2005) and computer science (Nisan, 2007) to business (Brandenburger & Nalebuff, 1996) and even to biology (Barash, 2003).

A game normally consists of a set of players with strategies that are available to them. The outcome is the result from the sequence of actions played by all players, with each player hoping to achieve their own desired outcome (Osborne & Rubinstein, 1994).

There are various types of game, one of the most commonly used and perhaps the most famous of which is known as the prisoner's dilemma (see
Appendix 2). In the prisoner’s dilemma, the situation is that each player has a personal incentive to do something that ultimately leads to a result that is bad for everyone, and when everyone similarly does what their personal interest dictates (Dixit & Nalebuff, 2007). The dominant strategy is the strategy that is always better than all the other strategies for a given player (Bierman & Fernandez, 1993). However, in the prisoner’s dilemma game, the dominant strategy leads to the safest outcome rather than the best outcome (Gintis, 2009). Other types of game that are commonly used include zero sum (where one player’s gain is another player’s loss), non-zero sum (where one player’s gain is not necessarily another player’s loss), non-cooperative game (where players’ decisions are based only on their perceived self-interest), and cooperative game (where commitments are fully binding and enforceable) (Aumann & Hart, 1994). For the interest of this research, non-cooperative game and cooperative game will be the most-discussed types of game.

In a non-cooperative game, a player’s commitments are not enforceable. Even if pre-game communication is possible, players are not able to make binding agreements except for those that are specifically allowed by the rules of the game (Montet & Serra, 2003). In such games, the emphasis is mainly on an individual’s behaviour. What decision should each rational player make, how do they actually choose their actions, and what is the most likely outcome of the game? These are the questions that should be considered.

In contrast to the non-cooperative game, cooperative games assume that commitments are fully binding and enforceable, which means cooperation is exogenous (Montet & Serra, 2003). Rational players can negotiate and make binding agreements about how to play a game. It can be seen as a special
case of non-cooperative game in the sense that negation and an enforcement procedure may be built explicitly into the rules of the game (Colman, 1982). Therefore, in a cooperative game, the emphasis is on coalitions of players. What sort of coalition should be formed and how they share the payoffs between each player are both issues requiring consideration.

Game theory can also be viewed as a generalisation of decision theory, just as suggested by Aumann (1987, p.461) ‘Interactive decision theory would perhaps be a more descriptive name for the discipline usually called game theory’. This statement is reasonable, considering that in game theory the decision of one player affects the welfare of others and vice versa. Game theory aims to predict the strategic decisions made by the participants in any game (Hargreaves-Heap & Varoufakis, 1995). This is essentially where the difficulty of game theory lies: generally the implication of a player’s action depends on the other players’ actions which he/she cannot observe and must therefore forecast; this is the so-called strategic uncertainty (Bierman & Fernandez, 1993). To solve, or minimise this uncertainty, there are various solution concepts. The most commonly used solution concepts include the Nash equilibrium, where every player believes that he/she is doing the best he/she can in response to the other players’ strategies, and the dominant strategy equilibrium, where each player chooses the strategy that is always better than all other strategies for that player (Osborne & Rubinstein, 1994).

Backward induction is also one of the common solution concepts, especially in games when players move sequentially. It calls for all players to envisage themselves at the end of the game and work backwards to decide the rational strategies each would play in the final period (Montet & Serra, 2003). The
backward induction approach has the advantage of offering a way around the impenetrable multiplicity of strategies found by forward reasoning and suggests a way of dealing with one of the major problems in game theory: multiple equilibria.

In game theory, the situation of conflict and cooperation between individuals or groups of people must be understood. This is because the objectives are generally more complex than simply beating their opponents (Montet & Serra, 2003). For example, in economics, companies can confront each other in some way (competing for market shares) whilst working towards the same goal in a different respect (broadening the whole market). In this sense, game theory seems to offer a natural framework for the classical issue of business: what happens when profit-maximising companies have to decide on their conduct when the decisions made by any one of them significantly affects the market possibilities facing its rivals (Hall, 1994)? Economists in the field of industrial organisation in particular have been using game theory to study the situation of oligopoly, in which the market is neither characterised by perfect monopoly nor perfect competition and there are sufficiently few companies that each company should be able to anticipate what the others will do (Cabral, 2000).

2.2.2 Application of Game Theory in Practice

Problems of Mathematically Based Game Theory Application

The power of game theory is its generality and mathematical precision (Camerer, 2003). However, like all theories based on mathematics, game theory is proven correct as the conclusion is drawn by the developers
following assumptions made, whether explicit or implicit (Cooper, 2007). The problem is that many assumptions that can be used as foundations for game theory have little empirical support, therefore game theory might be simply a set of answers to mathematical questions and such answers can neither be disproved nor improved upon by observing the behaviour of certain experiments (Butler, 2005). Game theory seeks to explain behaviour in a mathematical way and therefore assumes that all the players are both rational and self-interested (Binmore, 2007). However in real life, people often do not act in a rational manner due to cognitive limits and social preferences (Etzioni, 2010). Therefore, to perform this study more effectively, a more practical perspective of applying game theory to business is needed, rather than concentrating on the mathematical issues of game theory.

**Bounded Rationality**

Bounded rationality is introduced to focus attention on the discrepancy between the perfect rationality that is assumed in classical and neoclassical economics theory and the reality of human behaviour as it is observed in real life (Simon et al. 2008). Simon (1956) who created the beginning of the theory of bounded rationality argued that full rationality requires unlimited cognitive capabilities, however, human beings’ cognitive capabilities are quite limited, and sometimes even if conclusions are reached by rational deliberations, they may be overridden by strong emotional impulses. Therefore, the decision-making behaviour of human beings cannot conform to the ideal of full rationality (Butler, 2005).

**Behavioural Game Theory**
Game theory has been criticised as it ignores the fact that people do not often act in accordance with canonical models, which do not account for cognitive limits and social preferences (Simon et al. 2008; Butler, 2005; Binmore, 2007). To complement this, Camerer (2003) introduced the concept of so-called behavioural game theory in which he assumed that real players are bounded rational. Camerer (2003) reviewed dozens of experiments to identify behavioural regularities that could be extracted from them and then confronted these regularities with the sharp predictions of canonical game theory. Behavioural game theory is an improvement of game theory in terms of practicality as it establishes behaviour regularities in the canonical theory. However, Camerer (2003) adapted the mathematical approach to illustrate his findings and also omitted cooperative games in his study (Butler, 2005). Therefore, although the concept of behavioural game theory is helpful, it may not be the most appropriate perspective to conduct this research.

*Phenomenon of Game Relativity*

Vlaev and Chater (2006) argued that the attributes of previously seen games influenced judgements and decisions of players in the current game, which suggests that games are not considered independently of the previously played games, whether the indicators are predicated behaviour of the opponent or a choice of strategy. The normative approach of game theory, instead of being based on empirical data on human behaviour, aims to specify how people should be making decisions and assumes that people make sequentially independent decisions. In their research they found that people actually make choices depending on the other games being played; a phenomenon they called game relativity.
The context influence indicates that a player could use his/her current action as a strategic move in order to create an expectation of the future play, which will encourage or discourage the other player to play in a particular way in future. This is so-called signalling behaviour (Hargreaves-Heap & Varoufakis, 1995). Sometimes, such signalling behaviour is considered briefly as reputation. The studies of context influence and signalling behaviour are important to this research. This is because the importance of signalling behaviour lies in its potential for strategic use. As in real life due to asymmetric information, such behaviours are essential in order to shape others’ perception.

**Analytical Game Theory Approach**

Brandenburger & Nalebuff (1996) illustrated how to apply the practical and analytical perspective of game theory to an organisation’s strategies. There is practically no complicated mathematics involved in terms of illustrating the application of game theory to a business strategy. Instead, the authors separate game theory into five elements, the Players, Added values, Rules, Tactics and Scope (PARTS) to illustrate how to use game theory as a framework to analyse a strategic situation that a company may face. Brandenburger and Nalebuff first introduced the PARTS value net in 1995 through their article “The right game: Use game theory to shape strategy”. They explain that through using PARTS as the comprehensive theory-based set of lever, it could help companies generate strategies to compete with their rivals. Brandenburger & Nalebuff (1996) also apply many real life case studies to support their theory, which is more convincing in terms of business practice,
as experiments and mathematic formulas cannot do better than explaining the interaction between companies in the real world.

Therefore, based on Brandenburger & Nalebuff’s (1996) study, the practical and analytical perspective of game theory is more suitable for the nature of this research as the aim is to build a conceptual framework, from the strategic management perspective, for the application of incentives for innovation in order to respond to signals that there is a need to innovate. Game theory is applied as a framework for the analysis of interactions between companies and identification of how the incentives for innovation arise.

2.2.3 Review of co-opetition

Stein (2010) states that the concept of co-opetition was first mentioned in the literature in 1913 by Cherington. However, it did not receive massive public attention until 1996 when Brandenburger and Nalebuff published their book “Co-opetition”. Since then, the literature on co-opetition has developed rapidly and the concept has been used to explain many economic and social phenomena in various industries and countries.

Brandenburger and Nalebuff (1996) define co-opetition as a strategy that goes beyond the conventional rules of competition and cooperation to achieve the advantages of both. However, it is criticised by Dagnino and Padula (2002) as being oversimplified and lacking theoretical foundations. They believe co-opetition does not simply emerge from coupling competition and cooperation, but from merging competition and cooperation perspectives together to form a new type of strategic interdependence between companies, giving rise to a co-opetitive system of value creation. Co-opetition strategy
refers to a strategy that consents the competing companies to manage a partially convergent interest and goal structure and to create value by means of co-opetitive advantage. When co-operation is recognised as a strategy, it can be analysed in terms of its ability to influence companies to address competitive problems and to form a sustained competitive advantage. Dagnino and Padula (2002) integrate theories of competition and theories of cooperation to generate an enhanced understanding of sustained business performance, emphasising the strategic phenomena as a company requiring both a competitive advantage and a cooperative advantage by simultaneously competing and cooperating.

Bengtsson and Kock (2000) connect the concept of co-opetition with supply and value chain theoretical framework, suggesting three different types (cooperation-dominated relationship, equal relationship, and competition-dominated relationship) of co-opetitive relationships between competitors. Bakshi and Kleindorfer (2009) further applied the concept of co-opetition to investment for supply chain resilience, especially when bargaining with incomplete information. On the other hand, Luo (2004) discusses co-opetition in international business. He believes the rise of co-opetition is attributable to the increasing interdependence between global players and the need for collective action, risk sharing, and strategic flexibility. Luo (2004) suggests the typology of the intensity of co-opetition by identifying four situations (contending, isolating, partnering, and adapting) to describe the degrees of cooperation and competition between global rivals, and to capture the diversity of co-opetition he also identifies four positions (dispersing, concentrating, connecting, and networking), depending on the number of
global rivals and the number of international markets the company involves in co-opetition. Each player has a unique position in the game of co-opetition, requiring specific tactics to respond to forces of cooperation and competition so as to secure maximum returns (Gnyawali et al., 2006).

Brandenburger and Nalebuff (1996) discuss competition as a zero-sum game (win-lose game), where a rise in one’s profit comes only at the expense of rivals; cooperation as a positive-sum game (win-win game) improving mutual benefits such as the potential demand and market size. Walley (2007) suggests that co-opetition as a variable-positive-sum game (win-win-win game) as not only the companies, but also the consumers can gain benefits from the co-opetition relationship.

Although co-opetition is considered as a win-win strategy, companies may struggle with a dilemma between the mutual benefits of working together in order to create value and the temptation of being opportunistic in order to appropriate a greater share of the created value (Lavie, 2007; Ritala & Hurmelinna-Laukkanen, 2009). Brandenburger and Nalebuff believe a company can achieve both positive-sum gains as well as zero-sum benefits by avoiding mutually destructive competition and changing at least one element of the PARTS value net. From a game theory perspective, the better way is to find win-win opportunities with competitors because it is very difficult to eliminate them. As suggested by Bengtsson and Kock (2000), co-opetition offers a perspective where organisations can interact in rivalry due to conflicting interests, and simultaneously cooperate due to common interests, as trying to do well and trying to beat others are two different things.
The advantages that can be achieved through co-opetition are: first, there is greater potential for new opportunities; second, there is less resistance to the company’s moves as others are not being forced to give up ground; third, the new game is more sustainable as it does not force other players to retaliate (Brandenburger & Nalebuff, 1996). Therefore, co-opetitors may be critical sources of innovations, organisational learning, complementary products, capabilities and resources and lead users, and companies should focus on other players’ strategic moves rather than their own strategic position (Quintana-García & Benavides-Velasco, 2004).

Although Stein (2010) argues that Brandenburger and Nalebuff did not explain the foundation of co-opetition in terms of economic sciences, and the structure of the PARTS value net is disputable. Dagnino and Padula (2002) also raise the question of the concept of co-opetition being oversimplified. Brandenburger and Nalebuff illustrate co-opetition as a practice-oriented approach towards business strategy theory with the guidance of game theory. To form a theoretical foundation and structure for co-opetition or investigate its practicability is not the aim of this study, and neither is ranking the incentives. The order and structure issue as criticised by Stein (2010) are also irrelevant to this study. Despite the limitations, the analytical game theory approach suggested by Brandenburger and Nalebuff (1996), especially the PARTS value net, provides a useful tool for identifying and analysing the incentives for innovation. As co-opetition is a way of defining a strategic game of interaction, it helps to highlight the importance of strategic interaction of companies, and also provides a better understanding of the relationship between the chosen strategy and performance (Hernandez et al., 1998).
Part Two: Innovation Management

2.2.4 Introduction to Innovation Management

Innovation is one of the most important concepts for modern business. As stated by Trott (2008, pp.13), “not to innovate is to die.” Many business magazines, including Fortune (the world’s most admired companies) and BusinessWeek (The world’s 50 most innovative companies) use innovation as one of the criteria to evaluate the success of companies. The idea of innovation is now widely accepted and companies need to be able to adapt and evolve if they are to survive (Darsoe, 2001). According to the Oxford Dictionary of Business and Management (2006), innovation is any new approach to developing, producing, or marketing that gives the innovator an advantage over the competitors. Drucker (1993) also defined innovation as the creation and implementation of new knowledge in a product or service that yields profit.

As suggested by Schumpeter (1962), competition of the new technology, the new product, the new source of supply and the new type of organisation is the competition that is much more effective in terms of changing the trend in the market. Innovation is critical, not only for those who wish to accelerate or sustain the rate of growth, but also for those who wish to change the direction of economic advance (Freeman, 1982). Creativity and innovation are now the essential elements in every business strategy, irrespective of whether the business operates in a young, growing industry or in a mature, established one. There are always pressures to force companies to improve their performance; however the traditional approaches of cutting costs, raising
prices, or copying others will only ever be of limited help to a company. To go beyond these traditional approaches, a company needs to adopt the approach of innovation to increase profit and long-term growth.

The most important advantage that innovation can provide to the company is that if the company is the first to introduce the innovation into the market, it can receive a temporary monopoly, either tangible (profit) or intangible (reputation), although eventually competitors will find ways to imitate the innovation (Kamien & Schwartz, 1982). Imitation usually reduces the profit available to the innovator. Nevertheless, it is also possible that the presence of other competitors may broaden the market and so increase the profit for the innovator, for instance, the smart phone market. The “Innovation War” describes a trend of increasing the number of launches of new products and services every year whilst decreasing the development life cycles (von Braun, 1997). Therefore, being able to continually innovate is important for companies in terms of long-term growth.

However, innovation is a very difficult task and is always accompanied by high odds of failure. This is partly because the process of innovation is rather complicated. As suggested by Freeman (1982), innovation is the technical, design, manufacturing, management and commercial activities, including the marketing of a new or improved product or the first use of a new or improved manufacturing or management process or equipment. Failure in one stage could result in the failure of the whole process. Another contributing factor to innovation risk is uncertainty. This uncertainty could be market uncertainty: Will customers accept the new product, service or marketing approach? Will the innovation actually work under the market conditions? It could also include
organisation uncertainty: Will the organisational management system adopt the innovation smoothly? Will all the employees adopt the innovation efficiently? It could also be environmental uncertainty: Will the economic environment be stable enough for the innovation? Will the political environment be stable enough? (von Hippel, 1988.) Innovation involves numerous factors acting separately, but these factors often influence each other. Organisations have to respond to both internal and external events, some of which may even be beyond their control. Therefore, managing uncertainty is a central feature of innovation (Trott, 2008). Pearson (1991) developed an uncertainty map that provides a framework for analysing and understanding uncertainty and the innovation process (See Figure 2.1). The maps can help managers to consider how ideas are transformed into innovations in a very simplistic view of the innovation process.

![Figure 2.1. Uncertainty Map (Pearson, 1991)](image-url)
Nevertheless, although innovation is a high risk and possibly highly costly as well, as mentioned by Cooper (2001, p.4) “innovation is one of the riskiest, yet most important, endeavors of the modern corporation”. The risk is foreseeable, but in the increasingly competitive market, in order to survive and expand, sometimes firms are forced to take the risks.

Much literature regarding innovation focuses on one particular type of innovation: technology innovation; and this literature mainly focuses on one perspective of technological innovation, radical innovation. However, in the definition suggested by Freeman (1982), industrial innovation does not include only radical innovations but also incremental technological advances. Moreover, technological innovation is not the only type of innovation. Organisational innovation, management innovation, commercial/marketing innovation and other types of innovation are just as important as technology innovation (See Table 2.1) (Rothwell, 1992). Furthermore, it is common to associate innovation with physical change, but in fact many changes introduced within organisations involve very little physical change. Instead, it is the activities performed by individuals that change (Trott, 2008). Therefore, in the nature of this research, innovation is not regarded as any particular type. Instead, it is seen as a complete process and includes all the different types of innovation.
### Table 2.1. Typology of Innovations (Rothwell, 1992)

<table>
<thead>
<tr>
<th>Type of Innovation</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product innovation</strong></td>
<td>The development of a new or improved product</td>
</tr>
<tr>
<td><strong>Process innovation</strong></td>
<td>The development of a new manufacturing process</td>
</tr>
<tr>
<td><strong>Organizational innovation</strong></td>
<td>A new venture division; a new internal communication system; introduction of a new accounting procedure</td>
</tr>
<tr>
<td><strong>Management innovation</strong></td>
<td>Total Quality Management (TQM) system; Business process re-engineering (BPR)</td>
</tr>
<tr>
<td><strong>Production innovation</strong></td>
<td>Quality circle; Just-in time (JIT) manufacturing system; new production planning software</td>
</tr>
<tr>
<td><strong>Commercial/marketing innovation</strong></td>
<td>New financing arrangement; new sales approach</td>
</tr>
<tr>
<td><strong>Service innovation</strong></td>
<td>Internet-based financial services</td>
</tr>
</tbody>
</table>

There are mainly two schools of thought in terms of the incentives of innovation: the market-based view and the resource-based view. The market-based view, as suggested by Porter (1985) and Slater & Narver (1994), believes that the market conditions provide the context which both facilitates and constrains the extent of firms’ innovation activities. The ability of firms to recognise opportunities in the marketplace is the key issue. The market-based view is more or less in line with the market pull model (See **Figure 2.2**), which shows marketing is an initiator of new ideas resulting from close interactions with customers. Especially in fast-moving consumer goods industries, the emphasis is on the role of the market and the customer (Godin, 2006).

**Figure 2.2. Market Pull Model (Trott, 2008)**
On the other hand, the resource-based view, as suggested by Wernerfelt (1995), Prahalad & Hamel (1990) and Grant (1996), argues that a market-driven orientation cannot provide a secure foundation for innovation, as markets are so dynamic and volatile. In contrast, a firm’s own resources are able to provide a much more stable context in which to develop its innovation progress and shape its markets in accordance with its own conditions. The resource-based view also believes that whether or not a firm can successfully innovate depends heavily on its own resources, capabilities and skills, especially resources and capabilities that are valuable, rare and hard to copy. A sustainable competitive advantage can be achieved from these resources and capabilities, which frequently form the innovation (Grant, 1996). This perspective is more or less in line with the technology push model (See Figure 2.3), which considers the marketplace as a passive recipient for the results of R&D (Godin, 2006).

However, during the later development, both schools of thought began increasingly to be regarded as oversimplified and extreme (Rothwell, 1992). A more general process of coupling between science, technology and the marketplace should be more representative for innovation. Just as suggested by Freeman (1982), innovation is essentially a two-sided or coupling activity, therefore, an interactive model (See Figure 2.4) which emphasises that innovation occurs as the result of the interaction of the science base,
marketplace and the organisational capabilities, is still oversimplified, but perhaps more comprehensive in terms of describing the process of innovation (Rothwell & Zegveld, 1985).

Figure 2.4. Interactive Model (Trott, 2008)

During the past decade, technology transfer has had an increasingly significant impact on the management of innovation. In 2003, Chesbrough presented the concept of open innovation, which is also known as network models, with his emphasis on the new knowledge-based economy. Chesbrough (2003), adopting a business strategy perspective, argues that the process of innovation has shifted from one closed system, internal to the firm, to a new mode of open system involving a range of players distributed throughout the supply chain. The concept of open innovation seems to be supported by the increasing application of network theory in more and more areas of business management (Parkhe, Wasserman & Ralstan, 2006). The link between the external environment and the internal environment of the company is deemed to be crucial within the innovation process.
2.2.5 Incentives for innovation

The importance of innovation has been widely recognised by modern business as discussed in the previous chapter. Nevertheless, Aghion and Tirole (1990) characterise innovation activities as unpredictable, long-term, labour intensive and with a high risk of failure. Therefore, the right incentives that would induce the company to engage in innovation need to be put in place (Francis et al., 2009).

Von Hippel and Riggs (1994) discuss the incentives for innovation as they are the combinations of scientific curiosities and financial benefits. In modern analysis, investment in innovation has been recognised for the potential of allowing the company to acquire a strategic advantage. Trott (2008) believes that companies need to innovate to be dynamic so that they can be prepared for the unpredictable future. Hall (1994) also suggests that a company may use innovation-related investments in an initial period to change the economic conditions under which potential rivals perceive they may have to compete in future periods. Strategic innovation investment can offer company a competitive advantage compared with existing or potential rivals in terms of costs, production capacity, market accessibility or other aspects of performance (Pitt & Clarke, 1999). This competitive advantage is based on asymmetry. Such asymmetries appear naturally from innovation investment, which in future periods become irreversible or sunk. The assets that the company has acquired on a sunk cost do not need to be re-obtained. The capability and reputation that the company has built does not need to be re-created. Therefore, it can enjoy the benefits from the investment while the existing and potential rivals will not be able to compete with the company on
equal terms unless they make a similar investment themselves (Hall, 1994). As suggested by Grossman and Helpman (1991), companies may undertake innovation to seek profitable opportunities that arise from monopoly power. The company that made the investment first will enjoy a first mover advantage, being the leader in the market. Therefore the company is in a good position to be the sole supplier to the market and enjoy a monopoly profit for a certain period of time.

Furthermore, innovation can raise the barriers and thus limit potential entry. If a company is the first to make a strategic innovation investment, other firms which might want to compete with it are faced with the necessity of making similar investments and additional costs as followers in the leader-follower relationship in the market. In this sense, the first mover has created a barrier to entry for the existing rivals. It also changes the economic conditions under which potential rivals perceive they will have to compete if they wish to enter the market (Pitt & Clarke, 1999). As argued by Hall (1994), potential rivals will be deterred from entering a market if they believe the incumbent is committed to contesting the market. The incumbent can cause them to maintain such a belief by making performance-enhancing investments such as innovation investment, which are irreversible. Once the strategic investment has been made, it changes future competitive conditions and indicates to potential rivals that the incumbent is still committed to staying and contesting the market.

However, companies will only engage in costly innovation if they expect to enjoy large rewards on their investment or for a long enough period to justify their original costs. If the results of innovation can be easily imitated, others will be able to quickly follow where they have led and erode the potential
monopoly profits the innovator had hoped to earn. Lipsky (2004) believes that protection of intellectual property plays a significant role in promoting innovation. As explained by Reinganum (1989), there always remains an incentive for innovation when rewards are fully appropriable, even when the number of companies is large.

Once a patent protection becomes imperfect, the incentive for innovation will depend on the specific nature of institutions and the processes which determine the relative pay-offs for innovators and imitators. To this extent, spillover reduces the ability of an innovating company to appropriate the profits for itself. Therefore, there is a disincentive to undertake innovation. Nevertheless, Cohen & Levinthal (1990) suggest that when companies generate their own innovations, they also enhance their capacity to identify, assimilate and apply new knowledge that is being generated elsewhere. Therefore, due to the activity of engaging in innovation, the company’s absorptive capacity improves company-level innovation, which will also be encouraged when spillover from other companies is large, as increasing innovation will put each company in a better position to learn from others and appropriate the rewards from their work.

Collaboration is also suggested by Sampson (2007) as an incentive for innovation, as it can provide timely access to knowledge and resources that would otherwise be unavailable. Companies can combine each other’s resources in investing in innovation projects that involve high risks and require heavy investment (Tsai, 2009). Therefore, they may actively pursue inter-company cooperation to create knowledge and capabilities so that they can enhance their innovation outcomes (Ahuja et al., 2008). Cooperation in
innovation is further discussed in Part Three of this chapter as it is related to the application of game theory.

2.2.6 Strategic functions of innovation in game changing

Innovations are key drivers of a company’s profitability and growth (Grant, 2002). The strategic function of innovation has been emphasised as according to Schumpeter (1934), innovation by nature is considered to create market imperfections and thus leads to the generation of economic rent. In a perfectly competitive market of similar products, all products give equal value to consumers and thus no economic rent is earned. With the introduction of an innovation, as an improved version of the product, consumers would be attracted due to the greater value, resulting in the market becoming monopolistic in nature and helping the innovation earn economic rent. In such a situation, the economic rent generation is driven by the superior position of the innovation in the product hierarchy, and the importance of the additional value is the degree of market imperfection created, leading to greater economic rent for the innovation (Croitoru, 2012). Through innovation, the market condition is altered and the original game of business is changed.

The strength of innovation also lies in its ability to grant distinctive capabilities to the company that is engaging in the innovative activities. These capabilities are a combination of skills, tools, and processes which developed through innovation activities, and will improve over time to prevent competitors from catching up. As suggested by Mainardi et al. (2008), a strategy that is driven by these capabilities is the most reliable way for a company to thrive when the rules of the game for its industry are dynamic. Innovation can offer companies
competitive differentiation, helping companies to expand and identify potential markets. It can characterise the company by establishing an unique reputation for the company (Jaruzelski & Dehoff, 2008).

The strategic function of innovation is described by Tidd and Bessant (2009) as a collaborative process that is driven by goals and a vision that reconciles business strategy and operational capability with external markets. In a sustainable innovation game, all the major players involved can thrive. Miller et al. (2008) identify the game of innovation as patterns of innovating that involve many interdependent players, persist over time and are strategically complex. Companies accumulate capabilities through innovation activities, and make strategic decisions with considerations of market dynamics and the strategies of competitors (Yalabik et al., 2012). Through innovation, companies tend to change the game by market creation or market evolution (Miller et al., 2008).

Companies in the game of business make decisions concerning innovation in the different contexts in which they compete. Therefore, the fit between innovation situation and marketing strategy is important. As suggested by Sikdar and Vel (2010), companies should develop their marketing strategies in line with the innovation situation in order to achieve greater profit potential from innovation. This is because the importance of the innovation to consumers would be determined by how essential the innovation is to satisfying consumers’ need when compared to existing products or services, which would be impacted by the perception of the innovation’s benefits. The strength of an innovation’s position in consumers’ mind space can impact the
benefits of innovation when compared to existing products or services (Fill, 2005).

**Part Three: Game Theory Applied in Incentives for Innovation**

2.2.7 *New Industrial Economics: Cooperation in Innovation*

Since the early 1980s, a branch of literature known as new industrial economics analysed, especially in terms of cooperation, the conditions and incentives needed for firms to engage in R&D, which is a stage of the innovation process, by drawing on a game theoretic framework (Pyka, 2002). New industrial economics by its very nature moved away from the idea of perfect competition by invoking the structure-conduct-performance approach (an industry’s performance depends on the conduct of its firms, which then depend on the structure), where besides prices other means of competition such as marketing and innovation play a role in terms of determining firm behaviour (Howe, 1978). Game theory as a tool of analysis enables the explicit investigation of companies’ interactions. The majority of theoretical models analysed questions regarding the conditions and incentives necessary for companies to engage in cooperation in R&D and the welfare properties of the different possible solutions (Pyka, 2002). Innovation and competition are analysed in two stages: collaboration only in R&D, and collaboration in R&D as well as in the markets (Beath et al., 1989). The results indicate that either way, collaboration seems to improve the performance of companies as well as social welfare in situations where technological appropriability is low and technological spillover reduces the incentives for companies to invest in costly
and risky R&D processes (D’Aspremont & Jacquemin, 1988). Cooperation in innovation is considered as a means to restore reduced R&D incentives.

There also exists literature which deals with cooperative know-how exchange as a possible explanation for the empirical phenomenon of imperfect appropriability conditions. Game theory is applied in particular on the class of behavioural cooperative games. Von Hippel (1989) applied the prisoner’s dilemma to model the empirical phenomenon of informal know-how exchange between companies. Within the game-theoretic framework, they are able to show that under certain circumstances, informal know-how trading could become a Nash equilibrium if the game is repeated. Foray (1991) suggests that similar results can be expected when more than two players are engaged in this game, thereby transferring the result in multilateral cases.

2.2.8 Industrial Organisations: Innovation in Oligopoly Structure

Hall (1994) applied the game theory approach to analyse innovation within the framework of the theory of oligopoly. Oligopoly is a type of structure of the market designed to deal with industries in which the number of firms is sufficiently small that the behaviour of any one of them affects the market conditions controlling all (Porter, 1985). The modern theory of industrial organisation makes intensive use of game theory, as it seems to offer a natural framework for what is considered the classic problem of oligopoly: what happens when profit-maximising companies have to decide on their strategies when the decisions made by any one of them significantly influences the market possibilities facing its competitors? The game theory
approach makes it possible to incorporate genuine interdependence into the
analysis and can cope, up to a certain point, with uncertainty and
asymmetries. Hall (1994) argued that rivalry among profit-seeking companies
and innovations are inextricably connected. The need to survive and succeed
in the competition pushes the creation, and diffusion of new processes, new
technology, new management and also new products. Innovation forms part
of the competition to the extent that process innovation sharpens price and
competitiveness, while product innovation has a direct bearing on the
competitive quality of products and the effectiveness with which companies
can capture market segments and create market niches (Dasgupta & Stiglitz,
1980). Moreover, innovation introduced under the pressure of one period’s
competition helps to frame the conditions in which the next period’s
competition will occur (Hall, 1994). This is because during any one period of
innovation, the activity of companies changes the production processes and
the product would define the structure of the industry and the competitive
environment where future competition would take place (Hall, 1994). This
reflects the outcome of strategic patterns of behaviour, in which each
company takes into account the impact of their decisions on others and of the
reactions that their own conduct might induce.

In both static games (simultaneous-move, no uncertainty) and dynamic
games (sequential-move, uncertainty exists), Hall (1994) argued that collusion
could help companies to gain better pay-offs and save resources. The fewer
the companies in an industry, the easier it should be to set up a collusive
agreement and to monitor and enforce it. However in many countries, explicit
collusive agreements have been made illegal as anti-competitiveness devices
(Pyka, 2002). Collusion is also less likely to continue or even become established if an industry is experiencing rapid technical changes. Therefore, collusion will be least prevalent where innovation is most rapid, especially in new developing industries.

Also, according to the research of D’Aspremont et al. (1979), when two companies are asked to choose their location simultaneously in a linear city model of product space and subsequently to decide their prices, the two companies locate at opposite ends of the city. In this maximal differential case, Tirole (1988:281) concluded: “each firm locates far from its rival in order not to trigger a low price from the rival and thus price competition is softened”. Therefore companies could use differentiation, as the result of innovation, to avoid cut-throat competition with each other (Tirole, 1988).

Dasgupta & Stiglitz (1980) suggested that in the dynamic game where time and uncertainty are introduced, as the number of companies in the industry rises, each company spends less on R&D but the industry total of R&D rises because there are more companies operating. Increasing the number of companies reduces the probability of success of any one player, so reducing the benefit expected by each player from the innovation and also hastening the date of first success. This indicates that failure to cooperate leads each company to ignore the reduction that its own R&D imposes on the value of its rivals’ expected profits, so all the companies end up investing too much. There is an excessive duplication of effort because of the failure to communicate, providing an example of the classical prisoner’s dilemma (Tirole, 1988).
In the dynamic game, asymmetry among companies in games of innovation competition may arise in a number of ways. Hall (1994) divided asymmetries into two kinds: those that relate to the incentives facing intrinsically similar companies and those which make companies intrinsically different in ways that influence their innovation performance. In the extreme drastic innovation competition, technical progress changes rapidly, the incentive to all the companies is the same as if it wins, it earns the monopoly profits; if it loses, it earns nothing (Vickers, 1986). Beath et al. (1987) examine the inter-firm asymmetry with the approach that characterises a Bertrand equilibrium (a Nash equilibrium in the Bertrand model) in the market with differentiated products and to show that with product innovation, such competition can lead to either persistent dominance (similarly to process innovation) or to action-reaction. They suggest that for industries where the following assumptions hold, it is possible to form a condition for action-reaction in a Bertrand competition. First, technological change must be sufficiently rapid to make sure that neither firm can ever make the best response to a rival’s newly introduced technology or product. Second, suppose that the profit of a company applying the latest, top-quality patent decreases with the increase in quality of its competitor’s output, and that the joint profits of the whole industry increase with an increase in the quality of the product that is currently produced by the low-quality producers. Without these assumptions, it is possible for the industry to find a condition for persistent dominance (Beath et al. 1987).

Fudenberg et al. (1983) and Harris & Vicker (1985) explained the importance of first mover advantages. If one company enters a two-company patent race
before the other, the learning advantage, which gives the first an advantage over its rival, may often win the patent for that particular company. However, due to asymmetries and uncertainty, the first mover can only guess the level of its competitor's knowledge base with an information lag. Therefore, there is a danger that the latecomer may take the lead. The probability of its winning the race would rise above that of the first mover and could even make it unprofitable for the first mover to continue (Fudenberg et al. 1983). The existence of such information lag could have two effects: one encouraging latecomers to enter because they may now have a chance to win; the other forcing the first mover to invest at a faster rate than it would have done in the absence of the lag (Harris & Vickers, 1985). Furthermore, Teece (1986) argues that the first mover may also lose out if the later arrival is better equipped with distribution channels and has the capacity to generate new versions of innovation.

### 2.3 Strategic Threat and Signalling

A company is always operating within a larger external environment, however, the development and changes of the external environment are beyond the control of any single company (Beckman et al., 2004). A strategic threat, as defined by Lynch (2009), is any significant aspect of the external environment that can negatively affect the company and potentially undermine its strategy and strategic vision. The strategic threats that a company may face can come from changes in market conditions and consumers’ needs as well as from turbulence in the competition market created by competitors’ strategic actions (Chen et al., 2005).
Strategic threats can be identified through environmental scans that explore factors in each of the major environmental regions that serve as the most common sources of business threats. PESTLE (Political, Economic, Social, Technological, Legal, and Environmental) analysis is a framework for analysing and monitoring external marketing environment factors that have influence over a company (Lynch, 2009). The result of PESTLE analysis is usually used to identify threats and opportunities in SWOT analysis, which is an analytical method for identifying significant internal factors (Strengths and Weaknesses) and external factors (Opportunities and Threats) involved in a project or a business venture (Fine, 2009).

In addition, the Five Forces Model (see Figure 2.5) suggested by Porter (1985) provides a useful tool for analysing the competitive environment of the company. It identifies five basic forces that can act on the company and investigates how the company needs to form its strategy in order to develop opportunities in its environment and protect itself against threats. The strategic threats in the Five Forces Model mainly come from potential new entrants and substitutes. New entrants come into a market place when the profit margins are attractive and the barriers to entry are low. Substitutes do not entirely replace existing products but introduce new technology or reduce the costs of producing the same product (Jenkins et al., 2007). Effectively, substitutes may limit the profits in an industry by keeping prices down. Although the Five Forces Model has been criticised as being static and ignoring the possibility of cooperation, it is useful for analysing the environment as it forms a logical and structured framework (Makhija, 2003).
Strategic threats arise because of changes. In order to stay in the market, once a company has perceived a strategic threat, it should respond rapidly and effectively. The development of the innovative potential matches the path of development of the company and its structural units, and can also be perceived as a response to changes in the external environment and hence has a strategic nature (Rolik, 2013).

In early years, signalling theory was mainly studied in the context of examining the employment market (Spence, 1974) and price wars (Milgrom & Roberts, 1982). However, in recent years, signalling theory has been applied in the area of strategic management to study companies’ signalling behaviour in different contexts (Dao & Zmud, 2013). As defined by Porter (1980), a strategic signal is action by a competitor that provides an indication of its intentions, motives, goals, or internal situation. To build and maintain a sustainable market position, companies engage in various strategic moves,
aimed at influencing their market success and also the market success of their competitors (Boyd & Bresser, 2008).

Companies that develop innovations usually employ strategic signals to influence market participants’ perceptions of the uncertainties in the competitions (Schatzel & Calantone, 2006). Strategic signals that reveal events and developments reflecting the company’s strategic move to build a stronger market position can reduce the market uncertainty perceived by stakeholders (Sorescu et al., 2007).

2.4 Gaps between Application of Game Theory and Innovation Management

The existing studies regarding game theory applied to innovation mainly concentrate on one perspective of innovation: technical R&D, and on one particular type of innovation: product innovation. Cooperation in innovation is suggested as being more efficient and more effective, but in comparison, there are much fewer studies that discuss innovation in the non-cooperative game.

Nevertheless, the existing studies provide the foundation for this research. Based on the existing studies, this research will study innovation in two types of game: the non-cooperative game and the cooperative game. When and how will incentives for innovation appear? How can a company change the game of business through engaging in innovation? These questions will be studied under the guide of strategic management perspective and the analytical game theory approach.
The existing studies show that there is a gap between the application of game theory framework and innovation management; a gap this research aims to fill. Innovation will be discussed as a complete concept, and not a specific type thereof. Game theory will be applied in a practical analytic perspective, not a mathematical perspective. Through these aims, this study hopes to build a conception framework, from the strategic management perspective, for the application of incentives for innovation in order to respond to signals that there is a need to innovate. Game theory is applied as a framework for the analysis of the interactions between companies and identification of how the incentives for innovation arise.

2.5 Relevant Literature

The most relevant publications discovered in the literature review for this research are summarised in Table 2.2. The publications are listed in alphabetical order of the relevant author.

<table>
<thead>
<tr>
<th>Author</th>
<th>Title of Publication</th>
<th>Relevant area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeman, C. (1982)</td>
<td>The Economics of Industrial Innovation</td>
<td>Incentives for innovation and innovation management</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Title</td>
<td>Focus</td>
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<tr>
<td>Lengnick-Hall, C. A. (1992)</td>
<td><em>Innovation and Competitive Advantage: What We Know and What We Need to Learn</em></td>
<td>Incentives for innovation and innovation management</td>
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<tr>
<td>Pyka, A. (2002)</td>
<td><em>Innovation Networks in Economics: from The Incentive-Based to The Knowledge-Based Approaches</em></td>
<td>Application of game theory to innovation and innovation management</td>
</tr>
</tbody>
</table>

**Table 2.2. The Most Relevant Publications**


The word ‘co-opetition’ is a combination of competition and cooperation. Brandenburger and Nalebuff argued that the essence of a business’ success does not necessarily lie in the failure of others. In fact, most businesses succeed only if others also succeed. They introduced a map for the game of business, called the Value Net (See Figure 2.6) to describe all the players and analyse the elements of competition and cooperation among them. They
also identified five basic elements of any game, providing the central conceptual scheme for applying game theory to a modern business. The five elements are: Players, Added value, Rules, Tactics and Scope (PARTS). Brandenburger and Nalebuff believed that the biggest payoff of a game of business usually comes from changing the game. This is because the game of business allows for more than one winner and the game does not stand still. The authors explained that the real success came from actively shaping the game you play, from making the game you want, not accepting the game you find. To change the game, the authors suggested the player has to change one or more of the five elements. They explained that through using the Value Net and PARTS as the comprehensive theory-based set of levers, companies could generate strategies and avoid the traps of strategy.

![Figure 2.6. The Value Net (Brandenburger & Nalebuff, 1996)](image)

They explained the application of game theory to modern business in a way that requires no mathematics or abstract theory, which makes it simple and
clear and therefore easier to apply to a real life business. Moreover, it introduced the concept of changing the game, which is an important concept for this research. Changing is not just to change the way the player plays, but also the game the player plays. Although the important function of innovation in terms of changing the game has not been mentioned clearly, the Value Net and PARTS still offered the theory-based method of how to change a game. To further develop and expand the Value Net and PARTS strategy, innovation management should be introduced as an alternative strategy of business.

- **Bierman, S. H. & Fernandez, L. (1993), Game Theory With Economic Application**

Bierman and Fernandez mainly present the theory of non-cooperative game in an extensive form. As an introduction, it offers an overall view of the non-cooperative game, including games with perfect information, games with uncertain outcomes and games with incomplete information. Solution concepts such as the Nash equilibrium and dominant equilibrium, and analytical methods such as backward induction and the elimination of dominated strategies are introduced. They applied game theory in many fields such as labour economics, public sector, natural resource economics, regulation, international economics, finance, and industrial organisation. They suggested that the problem of the moral hazard in the insurance market and labour market occurred due to the lack of information about how rational players behave. A location model in which firms use patents to impede market entry by competitors and the problem of adverse selection in the credit market are discussed with the application of game theory. Moreover, Bierman and Fernandez explained the expected utility hypothesis, implying that for each
player in a game, each outcome of the game can assign a number called the outcome’s ‘von Neumann-Morgenstern utility’ to that player and the player acts as if he/she is maximising his/her expected utility. This hypothesis provides a method by means of which to illustrate how rational players choose strategies when there is uncertainty about the outcome of their choices. As for most games of business, the outcome of a strategy is always uncertain, so in situations where a company is uncertain about the outcome of an innovation, the expected utility can be introduced as a tool to help the company to decide its strategy.

It is useful as an introduction to game theory, especially in terms of non-cooperative game. Although the cooperative game has been omitted and there is complicated mathematics involved to illustrate the application of game theory, it still provides an overall explanation and illustration of game theory at an introductory level.


Dixit and Nalebuff applied game theory to strategic situations without the need for complicated mathematics to illustrate how it applied to many real-life situations and to explain how game theory works in strategic situations. They provided five rules of strategic behaviour with the application of game theory. The authors discussed games in two ways: sequential games and simultaneous games, and also introduced many concepts of game theory including backward induction, prisoner’s dilemmas, Nash equilibrium, dominant strategy, mixed strategy, signalling and bargaining behaviours. The
core belief is that strategic thinking is not only the art of surpassing a rival, knowing that the rival is trying to do the same to you, it is also the art of finding ways to cooperate, convincing others and even yourself to do what you say, interpreting and revealing information, and putting yourself in others’ shoes so as to predict and influence what they will do.

The concept of strategic move, which Dixit and Nalebuff introduced, is one of the most important concepts for this research in terms of game changing. The authors believed that in a game, one or both players might take actions to change the game to ensure a better outcome. Although the authors mainly discussed strategic moves in terms of psychological influence such as promises, punishments and credibility as the main methods of game changing, the study still provides insights on how players can play the game differently and shows their incentives for changing the game.

- **Freeman, C. (1982), The Economics of Industrial Innovation**

Freeman presented that the competition of the new commodity; the new technology, the new source of supply, and the new type of organisation are the competitions that count. In terms of innovation and the theory of the firm, he argued that innovation is essentially a two-sided or a coupling activity. On one hand, it involves the recognition of a potential market for a new product, service or process. On the other hand, it involves technical knowledge that may often include the result of the original research activity. Freeman concluded ten important characteristics of successful innovating companies in the industry. He also explained the four problems confronting the decision-makers in deciding whether or not to embark on an innovation project within
the company. The relation between the size of the company and innovation was discussed as well. Freeman believed that the greatest advantage of small companies lay in flexibility, concentration, and internal communication. However, the higher the development and associated innovation costs, the greater the advantage to the bigger scale producer. In terms of incentives for innovation, the author introduced six possible situations where companies may accept the high degree of uncertainty in innovation. He presented a qualitative checklist method and a quantitative cost-benefit approach of evaluating whether the innovation is worth doing. A combination of both approaches is possibly the ideal method of project selection. Moreover, Freeman suggested that by thinking in terms of a portfolio rather than a project, it is possible to select a blend of ‘safe’ and ‘high risk’ projects so that the more long-term and radical advances are not ignored, as they would tend to be if selection were based entirely on a scoring system or rate of return system. Finally, the author analysed innovation in terms of the strategy of the firm, presenting six alternative innovation strategies.

Freeman emphasised the importance of innovation for industrial organisations, and analysed the difficulties that companies may face when they have to make decisions on whether or not to engage in innovation. Although the interactions between firms were not discussed, as innovation was mainly focused from a technological perspective, it listed incentives that could drive companies to engage in innovation, and analysed the factors that distinguished successful innovations from failed innovations, which are important elements for this research in terms of analysing why and how companies innovate.

Hall explained the impact of technological change on economic activity and structures, and also explained the determinants, from an economic perspective, of technological change. Hall discussed the relationship between innovation, inter-company rivalry and industry structure. He argued that rivalry among profit-seeking companies and innovation are inextricably linked, as innovation is an essential part of the pursuit of profit and more fundamentally, it is essential to survival if rival companies are engaged in innovation. Hall also introduced the strategic use of innovation, which means that the innovation introduced under the pressure of one period’s competition helps to frame the conditions in which the next period’s competition will occur. Most importantly, Hall applied game theory as a framework to analyse inter-firm competition and innovation, suggesting that the implication of innovation for industry structure is dealt with endogenously, the game theory approach can incorporate genuine interdependence into the analysis and can cope, to some extent, with uncertainty and inter-firm asymmetries. Hall presented that companies could have done better by cooperating in both the static game and the dynamic game. In the analysis of technological competition with the game theoretic-approach, Hall discussed the effect of the number of companies in the industry and the level of appropriability.

The problem is that only the technological perspective of innovation has been discussed. However, the author applied the game theoretic approach to analyse how innovative behaviours influence the inter-company competition and industry structure, and explained the possible characteristics that could
affect innovation behaviour and also introduced another incentive for innovation, which is the strategic use of innovation.

- **Kim, C. W. & Mauborgne R. (2005), Blue Ocean Strategy: How to Create Uncontested Market Space and Make Competition Irrelevant**

Kim and Mauborgne argued that success comes not from battling competitors, but from making the competition irrelevant by creating ‘blue oceans’ of uncontested market space. To illustrate how to find the blue ocean, the authors applied real life examples, including Ford, General Motors, and Casella wines. They offered the four actions framework: eliminate, reduce, raise and create, to find and create the blue ocean. Red oceans are the description of a market environment where industry boundaries are defined and accepted, and the competitive rules of the game are known. In red oceans, companies try to outperform their rivals to obtain an increased share of existing demand. As the market space becomes more crowded, prospects for profits and growth are reduced. Blue oceans are defined as untapped market space, demand creation, and the opportunity for high profitable growth. In blue oceans, competition is irrelevant because the rules of the game are waiting to be set. The authors further explained the incentives of creating blue oceans, which included overcoming supply exceeding demand, trade barriers, increasing price wars and shrinking profit margins. Furthermore, they suggested that the blue ocean strategy is about risk minimisation and opportunity maximisation. Through the following six principles, the blue ocean strategy can mitigate the risks. These principles are: reconstruct market boundaries; focus on the big picture; reach beyond
existing demand; get the strategic sequence right; overcome key organisational hurdles; and build execution into strategy. Finally, they addressed the blue ocean strategy as a dynamic iterative process. When the blue ocean created becomes crowded (red) again, the company should jump out of it and look for another blue ocean.

The authors applied many principles and concepts of game theory to the blue ocean strategy by using terms such as players, rules, games and non-zero sum game. The blue ocean strategy provides an alternative strategy for companies who are in the wrong game and/or want to create a better one. It is an innovation of strategy, which offers a means for companies to change the game or to create a new one. However, the interactions between companies were not analysed in the blue ocean strategy. To create a blue ocean, the appropriate market situation should be explained and the possible interactions between the existing companies should be analysed. Nevertheless, the blue ocean strategy is a means for companies looking to avoid head-to-head competitions in the situation where there are powerful competitors in the market.

• **Lele, M. M. (2007), Monopoly Rules: How to find, capture & control the world’s most lucrative market in any business**

Lele explained the nature of monopolies and why the traditional definition of monopoly is oversimplified. Contrary to the conventional view of monopoly, which is large, illegal or heavily regulated, spanning an entire industry, Lele suggested that under his definition, monopolies are smaller, perfectly legal and focusing on specific, often narrow areas of markets. The author classified
monopolies by their sources: asset monopoly, which is based on tangible or intangible assets of the company, and situational monopoly. Due to the devastating changes to the global commercial order, everything is changing rapidly in unexpected, often totally unanticipated ways. There are more opportunities to find and exploit situational monopolies than asset monopolies. The author also explained the monopoly rules to help companies discover, seize, and retain control of the next monopoly space. Lele suggested that a company should find out where it can create a monopoly first, and then start to search for the strategy that will get the company there quickly and efficiently. To retain the monopoly position, a company needs to keep moving and searching for the next monopoly space.

Lele provided a new way for companies to search for new, breakthrough opportunities in the market. There are many similar concepts to the blue ocean strategy; for instance, the concept ‘monopoly space’ has many similar features to the ‘blue oceans’. Many real life examples are included to illustrate why and how temporary monopolies can lead a company to abnormal profits. Although innovation is not the main method proposed by the author for a company to achieve a temporary monopoly, it still provides a fresh insight of how a player can escape, change a game and create a new one to gain monopoly profit and the possibility of a win/win outcome for companies that are in the same industry.

- *Lengnick-Hall, C. A. (1992), Innovation and Competitive Advantage: What We Know and What We Need to Learn*
Lengnick-Hall suggested that innovation, technological advances, and competitive advantage are connected. The author examined four factors that shape the relationship between innovation and competitive advantage and also explained how different approaches to corporate entrepreneurship result in different opportunities and problem patterns related to those four factors. According to the author, innovations that are hard to imitate, accurately reflect market realities, enable a company to exploit the timing characteristics of the relevant industry, and rely on capabilities and technologies that are readily accessible to the company are more likely to lead to a sustainable competitive advantage. The routes to corporate entrepreneurship include formal research and development, internal venture, external joint venture, and acquisition. Formal research and development is strong strength in terms of maintaining and exploiting the company's configuration at which external joint venture and acquisitions are seriously weak. However, it is weak at excluding low market value features at which external joint venture and acquisition are strong. Acquisition also has weaknesses in timing and implementation of new technology. Internal venture is particularly strong in terms of exploitation of the company's capabilities and has no serious weakness.

Lengnick-Hall analysed innovation from the perspective of strategic management, exploiting the relationship between innovation and sustainable competitive advantage. Innovation is treated as a strategic process, not only product innovation or process innovation. The routes to corporate entrepreneurship are also strategies that companies can adopt for engaging in innovation with the aim of achieving a competitive advantage.
Lynch, R. (2009), Strategic Management

Lynch provided an overall view of strategic management, including tools for companies to analyse external strategic environments such as PESTLE (Political, Economic, Social-culture, Technological, Legal, Environmental), Five Forces, and Four Links. In terms of internal resources and capabilities, the author applied the resource-based view as the framework to analyse competitive advantages of companies. Lynch explained the seven elements of resource-based sustainable competitive advantage and the importance of core competencies. Lynch suggested that innovation should be one of the core competencies of a company as innovation can not only provide substantial future growth, but can also enable a company to leapfrog major competition. To encourage the innovation process, the author presented seven general guidelines. In terms of developing the business-level strategy, Lynch introduced the SWOT model (Strength, Weakness, Opportunity, Threat) and the Market Option matrix for companies to analyse their current market position and desired position. Strategic alliance is also introduced as a business-level strategy option.

This is one of the handbooks of strategic management. Because this research is under the guidance of strategic management perspective, it is useful as it offers a comprehensive understanding of strategic management and the concepts involved. In particular, the strategic role of innovation is explained in great detail, which provides a better understanding of the strategic use of innovation.
Pyka A. (2002), *Innovation Networks in Economics: from the Incentive-Based to the Knowledge-Based Approaches*

Pyka presented two approaches of innovation networks: the incentive-based approach, which includes transaction costs analysis and new industrial economics analysis, and the knowledge-based approaches. In the transaction costs analysis, firms are assumed to engage in cooperative relationships in order to minimise their transaction costs, especially in situations where there is system interdependence, asset specificity; tacit knowledge, market and technological uncertainties, and inappropriateness. In new industrial economics, cooperative R&D is considered as a method to restore reduced R&D incentives due to low appropriateness. The knowledge-based approach differs sharply from the incentive-based approaches. It explains innovation networking in terms of strategic behaviour, appropriateness and technological complementarily rather than in terms of costs. Factors such as learning, individual and collective motivation and mutual trust are what the knowledge-based approach of evolutionary economics explicitly takes into account. The core belief that Pyka introduced is that because modern technical solutions are characterised by an increased interrelatedness between various actors and knowledge fields, no single firm can keep pace with the development of all relevant knowledge. Therefore, innovation networks have gained significant importance as a method of coordination of industrial research and the R&D process.

Although Pyka mainly concentrated on the cooperative game and only considered innovation in terms of R&D and technological processes, he still provides a comprehensive explanation of the incentives that drive
organisations to cooperate in the innovation R&D process. Incentives including high risks of innovation, potential monopoly profit, quicker market introduction, exploration of new markets, new opportunities and technology complementarities can also be applied to explain why companies are more likely to engage in innovation when they are in a cooperative game.

• **Trott, P. (2008), *Innovation Management and New Product Development***

Trott presented a view of innovation management that focused on the links and overlaps between groups, including finance and business leadership, research and technology, and marketing, rather than on a single perspective. Trott examined different models of innovation and found that the organisational environment and the activities performed within it are necessary for innovation to occur. He suggested that successful companies are able to manage the dilemma of innovation and uncertainty. He also explained the role of strategic alliances and how companies are increasingly recognising that alliances could provide access to resources that are greater than any single company could possess. Furthermore, Trott identified that the ability of companies to exploit technological opportunities and convert intellect, knowledge and technology into things that customers want is one of the most important features that determines whether or not innovation can succeed. The ability to use its assets to perform value-creating activities can lead to the development of company-specific competencies that can determine the innovation potential of firms. In addition, he also provided a few models of the R&D process and the procedures of new product development.
Trott provided an overall view of innovation management, especially in terms of product innovation. Trott believed that it was important to note that companies do not operate in a vacuum; they trade with each other, work together in some areas and compete in others. Therefore, the role of other companies is a major factor in understanding innovation. Also at the heart of the thesis is that innovation needs to be viewed as a process, not a single stage, which is very useful for the development of this research, as innovation will be viewed a complete process, not as one particular type such as product innovation or process innovation.

Through viewing the literature above, the relevant subjects to this study can be summarised in the following section.

2.6 Relevant Subjects to the Study

From reviewing the relevant literature listed in the previous section, the synthesis of the relevant subjects to this research are categorised as following:

2.6.1 Blue Ocean Strategy

Kim and Mauborgne first introduced the concept of blue ocean strategy in 2004. In 2005 they published *Blue Ocean Strategy*, after which the concept became popular in terms of business strategy. Blue ocean strategy advocates that the success of a business comes not from battling against competitors, but from rendering the competition irrelevant by creating ‘blue oceans’ of uncontested market space. The cornerstone of the blue ocean strategy is value innovation, which means that instead of focusing on beating the competitors in existing market space, the company should focus on transcending existing market boundaries by creating a leap in value for the
buyer and the company which leaves the competition behind (Kim & Mauborgne, 2005).

According to the authors’ research, they suggested that there are neither perpetually excellent industries nor perpetually excellent companies. Therefore the company is not the appropriate unit of analysis in exploring the roots of high performance. The blue ocean strategy is based on a game that is not a zero sum game: a company can create a new market instead of competing in the existing one. This is one of the key differences between blue oceans and red oceans.

Red oceans, as suggested by Kim and Mauborgne (2005), are a description of a market environment where industry boundaries are defined and accepted, and the competitive rules of the game are known. Companies in the red oceans try to outperform their rivals to obtain an increased share of existing demand. However, as the market space becomes more crowded, prospects for profits and growth are reduced.

Blue oceans, on the contrary, are defined as untapped market space, which demand creation, and have the opportunity for high profitable growth. In blue oceans, competition with rivals is irrelevant because the rules of the game are still waiting to be set (Kim & Mauborgne, 2005). There always remains an incentive to create blue oceans when the supply exceeds demand and there are trade barriers, increasing price wars and shrinking profit margins in the current market. Blue oceans mean both being different and being a low-cost leader. It depends on value innovation not competitive advantage, and must try to attract markets not currently served (Abraham, 2006). Focusing on the
big picture and placing top priority on searching for new opportunities are the keys to the blue ocean strategy. However, as the blue ocean strategy is a dynamic iterative process, when the blue ocean created becomes crowded, i.e. turns red, the company should jump out of it and looks for another blue ocean (Kim & Mauborgne, 2005).

### 2.6.2 Temporary Monopoly Rules

Lele (2007) introduced an expanded definition of a monopoly, suggesting that monopoly is an ‘ownable’ space for a useful period of time. Contrary to the conventional view of monopoly, which is large, illegal or heavily regulated, spanning an entire industry, Lele (2007) suggested that monopolies can be created temporarily in the midst of competitors and do not have to have a government license. Therefore, under his definition, monopolies are smaller, perfectly legal and focusing on specific, often narrow areas of markets.

To know whether a company has a monopoly, the key is whether customers behave as if they had no other choice or whether the rivals see you or not (Abraham, 2006). A company should figure out where it can create a monopoly first, and then start to search for the strategy that will get the company there quickly and efficiently. To find a monopoly space, one should look for the pattern first: when there are emerging needs, incumbent inertia and new capacity, a monopoly space is opening up. Understanding the core belief, identifying the tidal forces, thinking like an entrant and not subscribing to the industry’s core belief, then validating your insight are the steps to discovering the next monopoly in the industry (Lele, 2007).
There are two types of monopoly, classified by their sources: asset monopoly, which is based on tangible or intangible assets of the company, and situational monopoly. Situational monopoly exists when a company is the only supplier of a certain product or service to customers in a particular combination of markets, needs, times and positions. Due to the New Competition, which is explained by Abraham (2006) as the devastating changes to the global commercial order, everything is changing rapidly in unexpected, often totally unanticipated ways. There are more opportunities to find and exploit situational monopolies than asset monopolies.

However, monopoly space is not permanent; the dynamics in the industry would end the old monopoly and also create new monopoly opportunities. To retain the monopoly position, a company needs to keep moving and searching for the next monopoly space.

**2.6.3 Resource-Based View**

The resource-based view was developed during the 1980s. No single author created the theory but rather the resource-based view reflects the development of an incremental school of thought over the last twenty years (Lynch, 2009). The fundamental principle of the resource-based view is that the basis for a competitive advantage of a company lies primarily in the application of the bundle of valuable resources at the company’s disposal and the capacity that the company processes (Wernerfelt, 1995). The resource-based view relies upon two key fundamentals assumptions about the resources and capabilities that a company may control: heterogeneity and immobility. These two are the key features in terms of transferring a short-run
A sustained competitive advantage is supposed to be able to create above average returns, enabling the company to engage in activities that increase its efficiency or effectiveness in ways that competing companies do not, and provide higher returns than were expected by shareholders (Barney, 1991).

**Figure 2.6. Seven Main Elements of Sustained Competitive Advantage**

*Redrawn from Lynch, 2009*

As shown in Figure 2.6, a sustained competitive advantage can come from different sources; innovative capacity is one of them, as the ability of innovation is immobility and casual ambiguity.

However, the resource-based view has been criticised as being tautological and has no consideration for human elements in resource development (Priem & Butler, 2001). There is also an argument saying that there is no...
emphasis upon the emergent approach to resource development, each element needs more definition, and that it will then happen automatically is a gross oversimplification (Collins, 1994). Moreover, one of the assumptions of the resource-based view, which suggests that a company can be profitable even in a highly competitive market as long as it can exploit its resources and capabilities, ignores external factors concerning the industry as a whole. It is unilateral. To survive and grow a company should also employ tools to analyse the external environment, such as Porter’s Five Forces (Porter, 1985).

### 2.6.4 Changing the Game of Business

Schelling (1981) is the first person to develop the idea that one or both players might take actions to change the game as a central theme of game theory. According to Dixit and Nalebuff (2007), actions that change the game to ensure a better outcome for the player taking the action are known as strategic moves. Strategic moves contain two elements: the planned course of action and the associated actions that make this course credible.

Brandenburger and Nalebuff (1996) suggested that the biggest opportunities and the biggest profits are not from playing the game well or differently, but come from changing the game. If the company is playing a game that they are weak at, then they need to change it to something that plays more to their strengths. Even if it is a good game, they should think about creating a better one. Changing the game is the essence of business strategy for high profit and long-term growth (Brandenburger & Nalebuff, 1996). A company does not have to accept the game in which it currently finds itself. By looking beyond the constraints of the current situation, a company is free to seek the greater
rewards that can come from changing the game. As suggested by Brandenburger & Nalebuff, (1996), PARTS, which means Players, Added value, Rules, Tactics, and Scope, is a framework for players who want to change the game. A player needs to change at least one or more of the five elements to change a game (Brandenburger & Nalebuff, 1996).

Dixit & Nalebuff (2007) argue that a player can change a game by making strategies credible. The way people perceive the game influences the choices they make. Any description of a game includes how people perceive the game, and how they believe other people perceive it (Brandenburger & Nalebuff, 1996). Schelling (1965) suggests actions such as commitments, threats, and promises will improve the outcome in a game if they are credible. Dixit & Nalebuff (2007) also explains that to make a strategy credible, contracts, reputation, and communication can be employed in order to change other players’ expectation. The job of managing and shaping the competitors’ perception is an essential part of business strategy, and sometimes it is customers or suppliers, not competitors, that need convincing. Perceptions play a central role in games: change people’s perceptions and the game is changed (Brandenburger & Nalebuff, 1996).

There are many ways to change a game, but according to Brandenburger & Nalebuff, (1996) there is one key principle, remembering that every game takes place in a larger context. This is the key that allows a game’s boundaries to be expanded or removed. Changing the game is one of the central concepts of this research. How to use innovation to change the game of business is one of the questions this study seeks to answer.
2.6.5 Strategic Alliance

Because of the increasing globalisation of businesses, strategic alliances are becoming more important worldwide for various reasons that range from market access to reduction of risk (Vyas et al. 1995).

A strategic alliance exists when several companies cooperate through some formal mechanism but industry output is not reduced (Kogut, 1988). There are different ways to classify the type of strategic alliances. Vyas et al. (1995) classify strategic alliances into two forms: market-related and technology-related.

Market-related alliances are more profitable for companies in a mature industry, while technology-related strategic alliances tend to benefit companies in a high technology industry where the need to innovate is more immediate (Varadarajan & Cunningham, 1995).

Contractor & Lorange (2002) classify strategic alliances into three forms: non-equity alliance, equity alliance and joint venture. For non-equity alliance, there is no cross equity holding and companies cooperate through contract, whilst in equity alliance there is an equity investment by one partner in the other and equity investments are often reciprocated. In a joint venture, the cooperating companies form a new independent company and the profits earned are shared among the cooperating companies (Das & Teng, 2000).

However, a detailed classification of different types of strategic alliance is not the purpose of this research. Therefore, the differentiation between different types of strategic alliance is not made in this research.
There are three major principal theories used to explain strategic alliances: transaction cost economics, organisation theory and business strategy. Transaction cost is defined by Kogut (1988, pp.320) as “the expenses incurred for writing and enforcing contracts, haggling over terms and contingent claims, for deviating from optimal kinds of investments in order to increase dependence on a party or to stabilize a relationship, and finally for administering a transaction”. Williamson (1983) developed the theory of transaction cost economics, suggesting that a company can choose alternative arrangements that could minimise the sum of production and transaction costs. The transaction cost theory argues that strategic alliances are designed to achieve such minimum cost arrangement (García-Canal, 1996). Toyne and Horaguchi (1990) add that minimising the cost is not the only purpose of strategic alliances; it is also designed to create new products, new markets, new organisations, new management techniques, and new technology.

Organisation theory approach, specifically the resource dependency approach, suggests that organisations depend on other organisations within their environment to acquire necessary sources (Varadarajan & Cunningham, 1995; Gulati, 1995). Joint venture is suggested as a means to stabilise the flow of resources that a company needs and also to reduce uncertainty (Pfeffer & Nowak, 1976).

The business strategy approach deals with the competitive advantages of companies. Porter (1986) argued that the formation of strategic alliances depends on the five forces as shown in Figure 2.5. Kogut (1988) also argues
that alliances could be a defensive mechanism in order to evade strategic uncertainty.

To achieve a better understanding of strategic alliances, the three approaches mentioned above should be considered more as complements to each other rather than as rivals.

One of the most important values of strategic alliances is the synergy effect, which means the value of resources and assets combined is greater than their separately summed values (Lynch, 2009). There are many competitive advantages of successful strategic alliances, and they are also the motives that drive companies to form an alliance (Kogut, 1988). Table 2.3 classified these competitive advantages under the three approaches mentioned above. All these competitive advantages strategic alliances can provide could also be the incentives that encourage a company to engage in innovation in the cooperative game.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance resource use efficiency</td>
<td>Acquire new skills</td>
<td>Entry into new markets</td>
</tr>
<tr>
<td>Resource extension</td>
<td>Entry into new product market domains</td>
<td>Circumvent barriers to enter new markets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Protect competitive position in home market</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broaden product lines/fill gaps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduce threat of future competition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Raise entry barriers</td>
</tr>
</tbody>
</table>

Table 2.3. Classifications of Competitive Advantages (Kogut, 1988)

Nevertheless, the decision to enter into a strategic alliance should be considered carefully as history has shown that alliances tend to be unstable
and prone to failure (Berquist et al. 1995). Companies that enter into strategic alliances tend to focus on the benefits without considering the costs involved in the establishment and maintenance of the alliance (Morris & Hergert, 1987). Strategic alliances can cause major problems if not managed properly. According to Berquist et al. (1995), there are three forms of misappropriating value: adverse selection where the value of inputs is misrepresented; moral hazard where providing inputs is of less value than promised; and holdup which means one partner exploits the transaction-specific investment of other partners.

**2.6.6 Strategic Decision Making**

There are many different descriptions of strategic decision-making. Mintzberg et al. (1976) describe it as ill-structured, non-routine and complex. Ginsberg (1988) suggests that strategic decisions are the responsibility of the top management, reflecting the interaction between an organisation and its environment, and show how an organisation manages this relationship. Strategic decisions may be formal or informal and can be both planned and emergent (Pennings, 1985). Both the inner context such as structural, cultural and political factors and the outer context such as competitive factors of the organisation influence strategic decisions significantly (Pettigrew, 1992). Moreover, as suggested by Stahl & Grigsby (1992), they deal with issues that are vital to the livelihood and survival of the organisation, typically addressing issues that are unusual for the organisation rather than issues that lend themselves to routine decision-making, and often involve a large proportion of resources. Therefore, strategic decisions are usually associated with different
trade-offs and risk, carrying high uncertainty and consequences that are difficult to reverse (Wilson & Cummings, 2003).

There are two main branches of the study of strategic decision making: content research and process research. Content research deals with the content of strategies such as portfolio management, diversification, mergers and the alignment of company strategies with environmental characteristics (Elbanna, 2006). Process research, on the other hand, examines the strategic decision process and the factors that affect it (Schwenk, 1995). Content research has been useful in providing guidelines on the types of strategies that lead to the best performance for different types of organisation in different competitive conditions; however, in the increasingly turbulent business world, some of the generalisations are becoming less useful (Schwenk, 1995). Harrison (1996) argues that a process perspective on strategic decision making is more likely to yield a successful outcome, conceiving the strategic decision-making process as a combination of the concept of strategic gap and the managerial decision-making process. However, just as suggested by Mintzberg & Waters (1985), content research and process research are complementary, not alternatives, and content research can influence the direction of process research and vice versa. Nevertheless, for the purpose of this research, the focus will mainly be on process research. Harrison (1996) suggests a process of strategic decision making by combining the concept of strategic gap and the managerial decision-making process (See Appendix 3). There are also several issues concerning the strategic decision-making process, including the dynamics of the process (Schultz, 1981), rationality
(Schwenk, 1995), political behaviour (Dean & Sharfman, 1996), and intuitions (Mintzberg, 1994).
Chapter 3 Research Propositions and Applied Theoretical Perspectives

Brief

This chapter describes the research propositions that are concluded from the literature review, as well as the theoretical perspectives that could guide the research. The objectives of this chapter are:

• To outline the research propositions that arose from the literature review in section 3.2.
• To identify and discuss the theoretical perspectives that could guide the investigation of the research propositions in section 3.3.

Following the literature review, this chapter provides a clear guidance for the next chapter, which is the research design, by identifying the research propositions and theoretical perspectives.
3.1 Introduction

The literature review has raised the issue of the application of game theory in incentives for innovation in modern business. There are a number of shortcomings in the existing studies, which have been identified in the problem statement. The relevant empirical knowledge and literature development still provide the theoretical foundation for the research. The issues raised from the problems noted from the existing literature can be identified and investigated from a different theoretical standpoint for explanatory purpose.

This chapter illustrates the propositions of the research and the theoretical perspectives from which they would be investigated and explained.

3.2 Propositions

The observations arising from the literature review raise the following propositions.

Proposition 1

There are signals that can give companies early warnings/hints as to the need for innovation in the market.

Proposition 2

Incentives for innovation can arise from the interaction between the company and a number of factors, as well as from the need to change the current game.
**Proposition 3**

There are potential problems when using innovation to change the game of business, but cooperation in innovation can lead to a win/win situation in the industry.

### 3.3 Applied Theoretical Perspectives

**Game Theoretical Perspective**

Game theory deals with the situation when one individual's actions depend essentially on what other individuals may do. It concerns how several individuals make decisions when they are aware that their actions affect others and when each individual takes this into account (Bierman & Fernandez, 1993). It is in nature an appropriate theoretical perspective for analysing and illustrating how a company interacts with various factors.

The practical analytical perspective of game theory suggested by Brandenburger and Nalebuff (1996) provides a theoretical framework for analyzing an organization's strategies, especially in terms of issues that involve interacting with others. Those interactions include external and internal, competitors and customers. The PARTS framework illustrates how to use game theory as a framework to analyse a strategic situation that a company may face and also provides a standpoint from which the game could change by innovation.

The game theoretical perspective provides the framework for identifying how the incentives for innovation arise and how to change the game through
innovation, as well as providing a standpoint from which the analysis and investigation would be conducted.

**Strategic Management Perspective**

Strategic management is an ongoing process that evaluates and controls the business and the industries in which the company is involved. It assesses competitors and sets goals and strategies to meet both existing and potential competitors (Lamb, 1984). Strategy formation involves performing situation analysis, self-evaluation, and competitor analysis, which is both internal and external. Competitions on the other hand derive competitive advantage, which could be achieved through differentiation, cost efficiency, or segmentation through targeting the unique needs of a specific market (Porter, 1985). Those concepts are the cornerstone of strategic management, and are also the issues that this research proposes to study and investigate.

The strategic management perspective provides the framework for analysing why the company chooses innovation as a method to change the game and how to change it, as well as providing a standpoint from which a comprehensive view of the study could be achieved.
Chapter 4 Research Design

Brief

The overall aim of this chapter is to discuss the methodology that could lead the research to achieve its aims and objectives effectively.

Therefore, the measurable objectives of this chapter are:

• To introduce the philosophical worldview that guides this study in section 4.1.
• To review and discuss the methodology chosen for the research in section 4.2.
• To select and explain the strategies of inquiry for the research in section 4.3.
• To outline the data collection procedure and explain this in more detail in section 4.4.

This chapter reviews the available methodologies. The methodologies for this study are chosen based on the research objectives and the research questions. The why and how of the design of this research are explained in this chapter.
4.1 Philosophical Worldview

The research philosophy that guided this research is the pragmatic worldview. Rather than being predetermined by antecedent conditions, actions, situations, and consequences are the factors with which pragmatism is concerned (Patton, 2002). Pragmatic worldview focuses on the research questions and uses all available approaches to investigate and explore those questions (Rossman & Wilson, 1985). Unlike positivism, which believes only observable phenomena can produce reliable data, or social constructivism, which emphasises only social phenomena and subjective meanings, pragmatism considers that both observable phenomena and subjective meanings can offer acceptable knowledge depending on the research questions (Tashakkori & Teddlie, 1998). It is suggested by Creswell (2009) as the worldview that is oriented from real-world practice.

In order to achieve the aims of this study, the research is designed with the guidance of the pragmatic worldview, as the research objectives are not only to identify and understand the incentives for innovation and also the situation where they arise, but also to help companies use innovation as a means of game changing in real-world situations in which credibility and practicability are the main issues. Methods, procedures, and techniques that could help achieve the research purposes effectively and efficiently are employed in order to improve credibility and practicability. Moreover, pragmatism adopts both objective and subjective points of view; therefore it is helpful in terms of understanding complex situations in the real world where there are uncertainties in the environment and in the complicated interactions between companies.
4.2 Research Methodology

Under the guidance of the pragmatic worldview, a mixed methodology combining both qualitative and quantitative approaches is employed.

4.2.1 Inductive Research Approach

The main difference between inductive and deductive approaches to research is that while a deductive approach is concerned with testing theory, working from the more general to the more specific, an inductive approach concerns generation of new theory emerging from the data, moving from specific observations to broader generalisations and theories (Saunders et al. 2009).

To achieve the aims of this study, the inductive research approach is employed. This is because through the inductive approach, extensive and varied raw text data can be summarised and analysed to establish linkages between the research objectives and the summary findings derived from the raw data (Trochim & Donnelly, 2006).

The inductive approach is generally associated with qualitative data, beginning with an open mind, aiming to generate a concept or theory based on the data, as the aim of this research is to build a conceptual framework, from the strategic management perspective, for the application of incentive for innovation in order to respond to signals that there is a need to innovate. An inductive research approach enables exploration of new or emerging area within the discipline. Therefore, this research follows the inductive process. The approach of sequential exploratory strategy is applied, with qualitative data collection and analysis in the first phase, and then quantitative data
collection and analysis building on the results of the previous phase in the second phase (Morgan, 1998).

4.2.2 Justification for the Chosen Methodology

The natures of qualitative and quantitative data are significantly different as shown in Table 4.1. To achieve the objectives of this research, the qualitative approach is the priority in terms of collecting and analysing data. The quantitative approach is applied to validate and generalise the findings from the qualitative approach.

<table>
<thead>
<tr>
<th>Quantitative data</th>
<th>Qualitative data</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Based on meanings derived from numbers</td>
<td>• Based on meanings expressed through words</td>
</tr>
<tr>
<td>• Collection results in numerical and standardised data</td>
<td>• Collection results in non-standardised data</td>
</tr>
<tr>
<td>• Analysis conducted through the use of diagrams and statistics</td>
<td>• Analysis conducted through the use of conceptualisation</td>
</tr>
</tbody>
</table>

Table 4.1. Distinctions between Quantitative and Qualitative Data

(Saunders et al. 2009)

This is because:

I. Understanding of the complex situation

As one of the objectives of the study is to identify the incentives for innovation and the situations where these incentives would arise with the application of a game theoretic concept, qualitative data that is
collected directly from people with business backgrounds could offer a better understanding of the topics concerned when compared to quantitative data from statistical procedures (Saunders et al. 2009). The qualitative approach such as case study and interview could provide opportunities to explore and investigate the interactions between companies and the functions of innovation throughout these interactions.

II. *Emergent process for exploration*

Creswell (2009) argues that one of the advantages of the qualitative approach is that its process is emergent rather than strictly prescribed. During the qualitative approach, as the topics of interest are being explored and expanded, the phases of process may alter accordingly. Therefore, the potential issues and problems emerging during the data collection procedures can be recognised and investigated, and thus the effectiveness of the research can be enhanced.

III. *Triangulation and enhancing credibility*

This study attempts to build a conceptual framework, from the strategic management perspective, for the application of incentive for innovation in order to respond to signals that there is a strategic threat. Therefore, the practicability of the study is important. In the qualitative approach, data is mainly collected from a relatively small sample size through case study and interview. In order to enhance the reliability and credibility of the results, they need to be validated in a larger sample size. Triangulating the results from multiple sources of data can be applied to enhance the reliability of the research. Triangulation, as
suggested by Jick (1979), is the employment of different research methodologies in one research to facilitate credibility of data. The quantitative approach such as questionnaire can generalise the results from the qualitative approach to a relatively larger sample size. Through triangulation, data is gathered from both qualitative and quantitative approaches, and the credibility and reliability of the research can thus be enhanced.

4.3 Strategy of Inquiry

In order to achieve the research objectives and answer the research questions, the strategy of inquiry of this research follows the process as shown in Figure 4.1.
Case study is a strategy of inquiry that allows in-depth investigation of-depth activities, processes, events, or people (Stake, 1995). It could also investigate a particular contemporary phenomenon within its real life context (Robson, 2002). By capturing the story behind the results, case study illustrates what happened to bring it about, providing opportunities to highlight the reasons for success and bringing attention to difficulties or challenges that may cause
failure (Neale, Thapa & Boyce, 2006). However, in this study, the case studies are all based on secondary data. This is because due to the lack of literature development in the research area as mentioned in the previous chapters, insights for the direction that could guide the following research are needed. As the first phase of the research, the purpose of the case studies is to provide a comprehensive understanding of how companies behave and the context of research subjects. Through the case studies, the research topics can be narrowed down and guidance can be provided for the following research. Other research methods such as survey and experiment are more explanatory than exploratory, and would only provide limited opportunities to search and explore potential issues that should be investigated further (Saunders et al. 2009).

Therefore, case study was chosen as the first phase of the research design in order to:

- Gain a comprehensive understanding of the context of the research;
- Explore issues that should be investigated further;
- Provide insights and guidance for the following stages.

Semi-structured Interview:

Semi-structured interview is one of the methods for phenomenological research. As suggested by Nieswiadomy (1993), the essence of experience regarding a phenomenon can be identified through semi-structured interview. The semi-structured interview approach is by nature powerful in terms of understanding subjective experiences, gaining information about people’s
actions and motivations. The purpose of the semi-structured interview approach is to identify how phenomena are perceived by the interviewees in a certain situation (Creswell, 2009).

Semi-structured interview is chosen as the second phase of the research design. It assumes a conversational manner and consists of open-ended questions and a certain set of questions so that the researcher can investigate the topics of interest efficiently and effectively (Yin, 2009). As suggested by Gubrium and Holstein (2002), this approach is often chosen because it is concerned with establishing common themes or patterns between certain types of participants. As the following stage of the case study, the semi-structured interview study can offer opportunities for in-depth and detailed investigation of the issues that arise from the case study so that the topics can be expanded and explored.

As the aim of the research requires insights and understanding of how companies behave in real life situations, the semi-structured interview has its strengths in being insightful and detailed. Moreover, as the research questions require investigation of the incentives for innovation and how to use innovation to change the game of business in more specific detail by following the guidance provided by the case studies, issues requiring investigation are more subjective than objective, so that participants’ personal opinions and experiences are important and valuable. However, experiment is more concerned with the facts and objectivity of the issues, while observation offers few opportunities to communicate with the participants (Saunders et al. 2009). Interview can derive interpretations, rather than facts or laws through
conversation so that the opinions of respondents can be communicated and their experiences can be noted (Gubrium & Holstein, 2002).

Therefore, semi-structured interview was chosen as the second phase of the research design in order to:

- Investigate issues that arise from the case study in greater detail;
- Explore the topics of interest in depth;
- Establish the initial concept map of findings so that it can be validated by the following study.

**Questionnaire:**

Questionnaire, as a type of survey, can provide a numeric or quantitative description of attitudes, opinions or trends of a population by researching a sample of that population (Creswell, 2009). The advantage of questionnaire study, as suggested by Saunders et al. (2009), is that it allows for the collection of a large amount of data from a population and the data collected are standardised, allowing ease of comparison.

Questionnaire as the final phase of the research design was employed to test and validate the data collected from the case study and semi-structured interview study, which mainly investigate a relatively smaller sample. Through questionnaires, the findings from the previous research can be generalised to a larger population, therefore enhancing the credibility and reliability of the research.
In comparison with the structured observation and structured interview, questionnaire is an effective and efficient way to gain access to a relatively larger population. As the final phase of research design, the purpose of the questionnaire is not to generate any new findings or explore any new issues, but to validate the findings from the previous stages. Standardised results can be analysed by descriptive statistics and results are easy to compare (Creswell, 2009).

Therefore, questionnaire was chosen as the final phase of the research design in order to:

• Validate the findings from the previous stages;
• Generalise the results of the research to a larger population;
• Standardise the findings to improve the consistency of the results.
• Triangulation to enhance the reliability and credibility of the research.
4.4 Data Collection Procedure

Data collection will follow the procedure shown in the following table:

<table>
<thead>
<tr>
<th>Data Collection Procedures</th>
<th>Design Details</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| Case Studies               | • Identify companies and events needed for review based on whether they are highly successful, not successful, typical, or of special interest.  
                                • Gather all relevant documents and information through newspapers, journals, and financial reports from companies, online databases, audio-visual material, and possibly interviews.  
                                • Review all relevant documents and information.                                                                 | • Provide context to other procedures through analysing companies that operate in real life situation. |
| Interviews                 | • Interviewees selected will have business backgrounds, possibly from companies that mentioned in case | • Seek the possible incentives that could drive a company to engage in innovation. |
                                |                                                                                      | • Recognise the situation where those incentives would arise. |
                                |                                                                                      | • Find out the possible factors that could affect the success of innovation. |
                                |                                                                                      | • Gather detailed information from the interviewees’ working experiences about the incentives for |
### Table 4.2. Data Collection Procedure

<table>
<thead>
<tr>
<th>Questionnaires</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Conduct around 10 semi-structured interview one-to-one interviews to help explore and explain themes that have emerged from case studies.</td>
</tr>
<tr>
<td></td>
<td>• All the interviews will be audio recorded.</td>
</tr>
<tr>
<td></td>
<td>• Send 100 or more self-administered questionnaires through Internet or intranet.</td>
</tr>
<tr>
<td></td>
<td>• The type of question is designed according to the results of case studies and interviews.</td>
</tr>
<tr>
<td></td>
<td>• Questions will be designed according to the results of case studies and interviews.</td>
</tr>
<tr>
<td></td>
<td>• Validate the data collected from case studies and interviews</td>
</tr>
<tr>
<td></td>
<td>• Standardize the results to improve the consistence.</td>
</tr>
<tr>
<td></td>
<td>• Generalize the results to a population.</td>
</tr>
<tr>
<td></td>
<td>• Triangulation to enhance the reliability and credibility</td>
</tr>
</tbody>
</table>

#### 4.5 The Application of Game Theoretical Framework to Research Methodology

This research applies game theory as a framework to analyse the interactions between companies and assist in gaining a better understanding of the
situation where the incentives for innovation arise. The application of game theoretical framework influences the design of research methodology in the following ways:

- Research philosophy: Although game theory, as a tool of analysis, makes it possible to incorporate interdependence, it can only cope with uncertainty and asymmetries to a certain point. Considering the complex and dynamic situation that businesses face, pragmatic worldview adopts both objective and subjective perspectives (Tashakkori & Teddlie, 1998). By taking both observable phenomena and subjective meanings into consideration, it can offer a better understanding of the research topics. It can also assist in enhancing the understanding of complex situations in the real world where there are uncertainties in the environment and the complicated interactions between companies.

Research methodology: The game theoretical perspective provides the framework to identify how the incentives for innovation arise and how to change the game through innovation by investigating the interactions between companies. Through the qualitative approach, data can be collected directly from people with business backgrounds. It can offer a better understanding of the relevant topics when compared to quantitative data from statistical procedures. The qualitative approach can offer opportunities to explore and investigate the interactions between companies and the functions of innovation throughout these interactions. To enhance the credibility of the research results, triangulation is necessary. Quantitative approaches such as
questionnaire can generalise the results from the qualitative approach to a relatively larger sample size. Through triangulation, data is gathered from both qualitative and quantitative approaches, and the credibility and reliability of the research can be enhanced.

• Research design: With the application of game theoretical framework, the research aims to build a conceptual framework, from the strategic management perspective, for the application of incentive for innovation in order to respond to signals that there is a need to innovate. The game theoretical perspective provides the guidance, especially in terms of designing the questions that need to be investigated at each stage.
Chapter 5: Case Study

Brief

This chapter describes the data collection and analysis of the case study. The substantial content can be divided into the following five stages.

• To list the criteria for case selection in section 5.2.
• To explain the design of case study in detail in section 5.3.
• To outline and illustrate the overall process of the case study in section 5.4.
• To conclude the findings from the case study and conduct analysis in section 5.5.
• To illustrate and present the results of the case study in section 5.6.

The case study, as the first phase of the research design, is to generate the initial direction that could guide the following stages and gain insights into the topic of interest. The findings of the case study are explored and validated by the semi-structured interview in chapter 6.
5.1 Introduction

To start the data collection procedures, the case study is conducted first. According to the definition provided by Yin (2009), a case study is an empirical inquiry that investigates a phenomenon in depth within its real-life context, coping with the technically distinctive situation where there will be many more variables of interest than data points.

According to Yin (2009), case study is mainly developed with empirical data and can be used for exploratory, explanatory and evaluation purposes, because the case study as a research strategy comprises an all-encompassing method. However, in this research, rather than explaining and evaluating the phenomena, exploring the contextual conditions is the main purpose of the case studies. Building and testing a theoretical model are not what the case studies in this research attempt to achieve. Therefore, the case information gathered in this study is from secondary data, including annual reports, marketing information, industry reports, and popular and academic press articles providing information on the cases.

Although a case study entirely based on secondary data cannot answer the research questions completely, it can give indications and allow further research and exploration on the subjects (Simons, 2009). As the research questions are to identify the incentives for innovation and explore how a company can use innovation to change the game of business, case studies in this research aim to provide the context information and enhance the understanding of how companies behave by reviewing data, including the operation and historical development of the case. A particular strength of case
study is that it can give the story behind the result by capturing what happened to bring it about, and it can be an opportunity to highlight a project’s success or draw attention to a particular challenge or difficulty of a project (Neale, Thapa & Boyce, 2006). This strength may be limited as the case studies are based on secondary data, but it is still useful in terms of narrowing down a broad field of research into researchable topics and providing direction for the following stages.

5.2 Case Selection

There are six cases selected for the purpose of this research as shown in Table 5.1 (details in Appendix 4). Companies or organisations selected in each case are from different industries, different countries, and are of different sizes as well. The reason for this is to explore the underlying pattern for general business as a whole, and not only one particular industry. The case selection is guided by the theoretical proposition and research questions mentioned above in order to discover categories and properties and to provide guidance for further research.

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Case Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case I</td>
<td>The seventh-generation video game console competition: Nintendo vs. Sony vs. Microsoft</td>
</tr>
<tr>
<td>Case II</td>
<td>The cooperation of Nokia and Microsoft in Smartphone industry</td>
</tr>
<tr>
<td>Case III</td>
<td>Market entry (vacuum cleaner industry): Dyson</td>
</tr>
<tr>
<td>Case IV</td>
<td>Market entry (soft drink industry): Innocent</td>
</tr>
<tr>
<td>Case V</td>
<td>Nissan electric car project</td>
</tr>
<tr>
<td>Case VI</td>
<td>Apple’s reinvention with iPod</td>
</tr>
</tbody>
</table>

Table 5.1. List of Selected Cases
5.3 Design of Case Study

The design of the case study is as following:

- Multiple-case study design was applied. There was more than one case studied in order to compare and conclude the findings.
- Unit of analysis:
  1). Events, such as the competition and cooperation between companies;
  2). Companies’ projects, such as new products or service development;
  3). Companies’ strategies, such as the change of business strategies.
- Criteria for case selection:
  1). Companies’ strategies/projects are highly successful;
  2). Companies’ strategies/projects are unsuccessful;
  3). Typical pattern.
- Game theoretical framework, mainly the PARTS value net was applied to guide the entire process of case study.
- For the case study, second hand data and information were the main data collected and analysed. Interviews on the next stage would expand and validate the findings from case studies to enhance the credibility and reliability of the data.

5.4 Process of Case Study

The overall process of the case study followed the basic process of theoretical sampling. As suggested by Glaser & Strauss (1967), theoretical sampling is
the process of data collection for generating themes. It is an ongoing process in which the researcher collects and analyses data and decides what data to collect next. Because the potential incentives for innovation are unclear, and the potential issues that might arise are also unknown, the theoretical sampling approach is useful especially in terms of generating themes in order to build the foundation for the following data collection, and also to provide the direction of the research. Therefore, the design of the semi-structured interviews depends on the results of the case studies, and questions that the interviews seek to investigate are revised accordingly.

Figure 5.1 gives an illustration of the process of the case study. By following this process, an initial concept map of the research was generated for further exploration and validation in the next stage.

![Figure 5.1. Process of the Case Study](image)
5.5 Analysis of Case Study

Questions that the case study seeks to answer are:

1. How do the incentives that could encourage companies to engage in innovation arise?

2. How can a company use innovations as a method of game changing?

3. Why use innovation to change the game of business?

Thematic analysis was employed as the strategy of analysing the case study. Thematic analysis is a qualitative analytical method for identifying and analysing themes within data (Braun & Clarke, 2006). It could help construct an index of central themes and subthemes (Bryman, 2008). Categorising and concept mapping were used in order to organise and make sense of the data. This is an inductive process in order to seek connections, patterns and propositions that could explain the data collected.

The following tables are the summarisation of findings from each case in terms of the research questions. The details of each case are available in Appendix 4.
### Research Questions

**Case I: The seventh-generation video game console competition: Nintendo vs. Sony vs. Microsoft**

<table>
<thead>
<tr>
<th>Finding</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>Fierce competition in the market is one of the incentives that drove Nintendo to be innovative.</td>
<td>The innovation of DS and Wii expanded the targeted markets for the industry (from teenagers and males to middle-aged people and females) and therefore brought more users to the market.</td>
<td>Sony and Microsoft already captured the majority of market share of the time. It is difficult for Nintendo to recapture the market share in an already quite limited market.</td>
</tr>
<tr>
<td><strong>II</strong></td>
<td>Sony’s dominant position in the video game market and the declining market share of Nintendo was also an incentive that forced the company to engage in innovation.</td>
<td>Nintendo made use of its expert experience of gameplay, putting the emphasis on the interaction between players and the fun of interaction, rather than superior graphic and processing power.</td>
<td>In terms of developing graphic and processing power, Nintendo didn’t have the technology to compete with Sony and Microsoft at the time.</td>
</tr>
<tr>
<td><strong>III</strong></td>
<td>Sony set up the trend in the video game market to its advantage that was hard-core, sophisticated, complicated and adult-oriented. This trend was not to Nintendo’s advantage. This was another incentive for Nintendo to engage in innovation.</td>
<td>The innovation of motion control managed to change the trend in the video game market, which is more interactive, easy to enjoy, and capitalised on intuitive nature.</td>
<td>Wii targeted different markets, including children, women and middle-aged people, which enable the avoidance of a head-to-head competition with Sony and Microsoft.</td>
</tr>
</tbody>
</table>

**Case II: The cooperation of Nokia and Microsoft in the Smartphone industry**

<table>
<thead>
<tr>
<th>Finding</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>The increasing competition in the mobile phone industry is an incentive that drives Nokia to be innovative.</td>
<td>Nokia entered a strategic alliance with Microsoft, hoping that the technology and the reputation of Microsoft together with its product and reputation would be able to grant the company a better chance to win in the</td>
<td>Cooperation with Microsoft means there are more resources available to both companies. It will reduce the risk of innovation to some extent as the two companies are sharing the risk</td>
</tr>
<tr>
<td>Finding</td>
<td>The trend in the industry has changed, as the emerging segment of smartphone is becoming more and more important. As the traditional leader in the industry, to maintain its position, Nokia has to develop new products and be innovative.</td>
<td>The emerging of the smartphone changed the game in the mobile phone industry from a battle of devices to a war of ecosystem. New players such as Apple (iPhone), RIM (BlackBerry) and Samsung (Samsung Galaxy) managed to capture the market share that was once Nokia’s. Nokia failed to adapt to the change of the game.</td>
<td>New players (Apple, RIM, Samsung) of the game can use innovation to change the traditional game and capture market share from the market leader (Nokia).</td>
</tr>
<tr>
<td>Finding</td>
<td>Nokia was too slow to react to the change in the industry. Regaining the market share it has lost is another incentive for Nokia to engage in innovation.</td>
<td>Nokia hopes that the cooperation with Microsoft can drive innovation that is at the boundary of hardware, software and services, with an attempt to offer an alternative ecosystem to the existing choices.</td>
<td>Cooperation with Microsoft also means that there are more resources available for R&amp;D and marketing, which would increase the chance of success of the innovation.</td>
</tr>
</tbody>
</table>

**Case III: Market entry (vacuum cleaner industry): Dyson**

| Finding | The newcomer to a business faces many disadvantages as it lacks proven products, brand name, loyal customers and relationships with suppliers. To overcome these difficulties is an incentive for Dyson to engage in innovation. | The bagless vacuum cleaner revolutionised the industry. It managed to break the traditional pattern created by the Hoover Junior model. | Launched an innovative product is a better way to capture market share as the majority of market share had already been captured by Hoover and Electrolux. To obtain market share, Dyson needs to do something different. |
| Finding | Hoover and Electrolux were dominating the market. Hoover’s Junior model was widely accepted by consumers. To enter the market | | Because there are dominant players in the market, Dyson launched a product which was quite different from the traditional one and also priced quite... |
Successfully, Dyson has to be innovative in order to capture market share from the market leaders. Highly, so it would be able to avoid head-to-head competition.

**Case IV: Market entry (soft drink industry): Innocent**

| Finding I | Entered the soft drink market as a small and entrepreneurial company, selling a very simple product, Innocent has to be innovative to survive and to obtain market share. |
| Finding II | There was no dominant brand in the smoothie market when Innocent entered. To stand out against all competitors, Innocent was driven to engage in innovation. |
| Finding III | After the recession in 2008, the smoothie market has been suffering from a decline in sales. To expand the market and also increase the sales is an incentive for Innocent to be innovative in marketing: focus on products for children. |

Instead of product innovation, Innocent was focused on brand innovation, putting its emphasis on the ethic and healthy brand image. Now being ethical is one of the most important claims for companies to make when they launch their new smoothies. As a small company producing an expensive commodity, brand innovation is a way that could possibly make the company stand out and bring success.

The fun, friendly and healthy image that Innocent has built makes it different from its rivals. In a market that is highly competitive and full of competitors who are producing substitutes, brand innovation seems to be the way for Innocent to stand out from the competition.

The change of focus of targeted market (children and parents) expanded the existing market and also brought more potential consumers to the market as when the children grow up, they might still retain the habit of drinking smoothies. The soft drink market is a commodity market and all the companies are selling very similar products. To overcome the recession and the decline in sales, marketing innovation seems to be the way to expand the market and increase the sales.

**Case V: Nissan electric car project**

| Finding I | The competition in the car industry has always been fierce. |
| Finding II | The Nissan Leaf is the first mass-market-all-electric car. It |

Due to the oil issue and the environmental...
The recession in 2008 hit the car market badly. In addition to the increase in petrol price, the need to open a new segment of the market is an incentive to innovate for Nissan.

**Finding II**

Nissan has not been seen as a company with ethics, or an innovative and exciting reputation. To re-establish its reputation is another incentive for Nissan to be innovative.

The launch of the Leaf re-established the reputation of Nissan, as the company is now more recognised as being innovative and environmentally friendly.

As the first mass-market-all-electric car, there is no major competitor in the market at the moment. Therefore Nissan can enjoy a temporary monopoly profit for a period of time.

**Finding III**

It is difficult for Nissan to compete with the market leader Toyota with its traditional products as the reputation of Toyota has been widely accepted. To challenge the dominant position of Toyota, Nissan has to engage in innovation.

Being the first to launch the mass-market-all-electric car, Nissan managed to bring the competition from the traditional market to a new segment with no major competitor at the moment.

The innovation of the Leaf managed to help Nissan to dodge the increasingly fierce competition in the traditional market and fend off pressure.

---

**Case VI: Apple’s reinvention with iPod**

Microsoft has been the market leader in the personal computer market for many decades. It is hard to compete with Microsoft in the personal computer market. It is essential for Apple to be innovative in terms of expanding its business.

The innovation of iPod and the iTune Store changed the way people listen to music and the way people acquire it. It revolutionised portable entertainment. It also built a new business model that combined hardware, software and services.

Microsoft’s dominant position in the personal computer market is widely accepted. Engaging in innovation in new products in new markets is one way to grow and remain competitive for Apple.
Finding II
The reputation built by Apple was recognised as being expensive and only for professionals and high-end consumers. To re-establish its reputation is an incentive for Apple to engage in innovation.

Apple managed to re-establish its reputation as being innovative, exciting and delicate. This creates a customer base that is devoted to the company and its brand. Successful innovation is a quick way to establish a new brand image and to become known to more potential customers.

Finding III
Apple’s original targeted markets were too narrow. This is an incentive for innovation for Apple in order to expand its targeted market and attract more potential consumers.

The introduction of iPod, iPhone, iTV and so on expanded the targeted markets of Apple. It also benefits the personal computer business as it is under the halo effect. The brand image of Apple was too limited at the time. Innovation in developing new product lines could expand its customer base and allow acceptance by a wider range of customers.

Table 5.2. Summary of Findings from the Case Study

To allow further analysis, the findings of each case can be categorised as follows:

For research question 1: How do the incentives that could encourage companies to engage in innovation arise?

<table>
<thead>
<tr>
<th>Merged Findings</th>
<th>From Which Cases?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When there are dominant leaders in the market, the incentives for innovation could arise.</td>
<td>Case I, Case II, Case V and Case VI.</td>
</tr>
<tr>
<td>2. Increasingly fierce competition in the market could force the incentives for innovation to appear.</td>
<td>Case I, Case II and Case V.</td>
</tr>
<tr>
<td>3. The pressure of getting out of the recession and also the need to expand the existing market and increase the volume of sales could drive the incentives for innovation to emerge.</td>
<td>Case IV, Case V and Case VI.</td>
</tr>
<tr>
<td>4. When the trend in the market has changed, especially if it changed to something that is not to the company’s advantage, the incentives for innovation could appear.</td>
<td>Case I and Case II.</td>
</tr>
<tr>
<td>5. A newcomer to a business or a market would face</td>
<td>Case III and Case IV.</td>
</tr>
</tbody>
</table>
many difficult situations during which the incentives for innovation could arise.

6. The need to re-establish the reputation and the brand image of the company could drive the incentives for innovation to come forth.  
   Case V and Case VI.

   **Special Findings**

7. When the company has been too slow to react or adapt to the changes in the market or industry, the incentives for innovation could emerge.  
   Case II.

8. When there is no dominant brand in the market, in order to stand out among competitors, the incentives for innovation could appear.  
   Case IV.

| Table 5.3. Merged Findings for Question 1 |

**For research question 2: How can a company use innovation as a method of game changing?**

<table>
<thead>
<tr>
<th>Merged Findings</th>
<th>From Which Cases?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A company can use innovation to change the trend in the market, revolutionise the industry and change the traditional pattern in the business, therefore creating a new game.</td>
<td>Case I, Case II, Case III, Case V and Case VI.</td>
</tr>
<tr>
<td>2. A company can use innovation to expand the existing market and bring more potential consumers to the market, therefore changing the scope of the game.</td>
<td>Case I, Case IV, Case V and Case VI.</td>
</tr>
<tr>
<td>3. Through innovation a company can change a competition, so that it can make use of its own expertise, rather than its competitors' expertise, therefore changing the rules of the game.</td>
<td>Case I, Case II, Case V and Case VI.</td>
</tr>
<tr>
<td>4. A company can use innovation to achieve the first mover advantage and enjoy a temporary monopoly, therefore changing the added value that the company can bring to the game.</td>
<td>Case III, Case IV, Case V and Case VI.</td>
</tr>
<tr>
<td>5. A company can use innovation to create a unique brand image or to change the company’s reputation. This could create a competitive advantage for the company, therefore changing the added value that the company can bring to the game.</td>
<td>Case IV, Case V and Case VI.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Special Findings</th>
<th>From Which Case?</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Cooperation in innovation with another company can combine both companies’ competitive advantage and grant a better chance for both companies to achieve success, therefore changing the tactics of</td>
<td>Case II.</td>
</tr>
</tbody>
</table>
7. Cooperation in innovation with another company in one competition can create linkage to possible innovation in other competitions, therefore changing the scope of the game.

Table 5.4. Merged Findings for Question 2

For research question 3: Why use innovation to change the game of business?

<table>
<thead>
<tr>
<th>Merged Findings</th>
<th>From Which Cases?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Majority of market share already captured by main competitors, especially if the company doesn’t stand a chance to compete with the main competitors on some aspects, innovation is a way for the company to survive and stay in the competition.</td>
<td>Case I, Case II, Case III and Case VI.</td>
</tr>
<tr>
<td>2. Innovation can help the company to avoid head-to-head competition with its main rivals, as innovation can create a new segment of the market and therefore distract the competition.</td>
<td>Case I, Case III, Case V and Case VI.</td>
</tr>
<tr>
<td>3. Innovation is a method for a company to stand out among competitors and to become known by more potential consumers, especially in a very competitive market.</td>
<td>Case IV, Case V and Case VI.</td>
</tr>
<tr>
<td>4. During recession, innovation is a way to overcome the shrinking market and the decline in sales.</td>
<td>Case IV and Case V.</td>
</tr>
<tr>
<td>5. Innovation is an effective method for a company to follow the changing trends in the market as well as the trend of policies.</td>
<td>Case II and Case V.</td>
</tr>
<tr>
<td>6. Cooperation in innovation with others can reduce the risk of failure as the cooperating companies are sharing the risk. Moreover, cooperation in innovation can also increase the rate of success as the cooperating companies are combining their resources.</td>
<td>Case II.</td>
</tr>
</tbody>
</table>

Table 5.5. Merged Findings for Question 3

5.6 Results and Summary of Case Study

After the analysis, the findings of the case study are concluded in Figure 5.2.

Due to the lack of literature development in the area as mentioned in the
previous chapters, research on the selected cases provides an insight for the
direction of the whole study and enables the researcher to generate the initial
concept map. The concept map forms the basic structure of the study from
which the following research procedure can test, investigate, and explore.
Based on the analysis of case studies, the direction of the research evolved
and changed as follows:

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do the incentives that could encourage companies to engage in innovation arise?</td>
<td>The findings suggest there are phenomena that can be seen as signals for companies, as there is a need to innovate. The interactions between the company and various factors could be the situations where the incentives for innovation arise.</td>
</tr>
<tr>
<td>How can a company use innovation as a method of game changing?</td>
<td>The findings suggest that the incentives for innovation could also arise from the need to change the current game. Innovation, as a strategic choice of the company, can change the current game of business by altering at least one element of the PARTS value net, and offering the company advantages.</td>
</tr>
<tr>
<td>Why use innovation to change the game of business?</td>
<td>The findings emphasise the strategic functions of innovation, as they are able to provide a competitive advantage to the company over its rivals.</td>
</tr>
</tbody>
</table>

Table 5.6. The Evolution of Research Direction
In situations:

- Dominant leaders exist;
- Competition becoming increasing fierce;
- Need to expand market and increase sale.
- The trend in the market has been changed, especially if it is not at the company’s advantage;
- Being a newcomer to the business;
- The company has been failed to react to the change in the market;
- No dominant leader exists therefore in order to stand out among competitors.

The need to change the current game appears because:

- Majority of market share already be captured by main competitors;
- To avoid head-to-head competition with main rivals;
- To stand out among many competitors;
- To overcome shrinking market size and sale volume;
- To follow the change in trend of both market and policy;
- To reduce risk choose to cooperate with others in innovation.

Choose to use innovation to change the game because:

- Innovation can revolutionize the market therefore creating a new game;
- Innovation can expand the market therefore changing the scope of the game;
- Innovation can change the competition to the company’s expertise therefore changing the rule of the game;
- Innovation can help company achieve first mover advantage therefore changing the added value the company can bring to the game;
- Innovation can create an unique reputation for the company therefore changing the added value the company bring to the game;
- Cooperation in innovation can increase the chance of success for both companies therefore changing the tactic of the game;
- Cooperation in innovation can create linkage to innovation in other competition therefore changing the scope of the game.

Figure 5.2. Conclusions of Findings of the Case Study
Chapter 6: Semi-structured Interview Study

Brief

This chapter describes the data collection and analysis of the semi-structured interview. The substantial content can be divided into the following six stages.

• To illustrate the criteria for interviewee selection in section 6.2.
• To present and explain the design of the semi-structured interview in detail in section 6.3.
• To describe and discuss the overall process of the semi-structured interview in section 6.4.
• To identify and explain the strategies for transcription and analysis of the semi-structured interview in sections 6.5 and 6.6.
• To conduct analysis of the data collected from semi-structured interviews in section 6.7.
• To illustrate and present the results of the semi-structured interview by means of the theoretical narrative and concept mapping.

Through the semi-structured interview, the issues presented by the case study are investigated further and more deeply. The topic of interest is explored with more detail so that the initial conceptual framework is established. However, the findings from the semi-structured interview are not conclusive, as they need to be validated and generalised in chapter 7 by the questionnaire.
6.1 Introduction

According to Yin (2009), interviews are guided conversation. The purpose of interviewing is to derive interpretations, rather than facts or laws from respondents’ speech (Gubrium & Holstein, 2002). Due to the nature and purpose of this research, semi-structured interviews were employed. Semi-structured interviewing is based on conversation where the researcher listens so as to hear the meaning of what is being conveyed (Rubin & Rubin, 2005). It is often chosen because topics of interest do not centre on a particular setting but on establishing common patterns or themes between particular types of respondents (Gubrium & Holstein, 2002). The design of semi-structured interview is often open-ended and assumes a conversational manner, but it is likely to follow a certain set of questions as guidance (Kvale, 1996).

Semi-structured interview has its strengths in being insightful and detailed. At the following stage of case study, the purpose of the semi-structured interview is to expand and explore in depth the issues arising from the case study. The aim of this research requires insight and understanding in how companies behave in a real life situation. To achieve the aim of the research, a set of questions were designed to guide the overall direction of the conversation, but the questions were open-ended, so that the topic could be expanded and explored further and more deeply, depending on the interviewees’ personal experiences and opinions.

Therefore, the interviews were semi-structured, consisting of open-ended questions to obtain a wide range of responses while also using some closed-
ended questions to gain more detailed information in the areas of interest (Gillham, 2000).

6.2 Interviewee Selection

Due to the aim of this research, interviewees were not selected based on ethnography, as the interest of this research does not centre on a particular setting but aims to establish common patterns and themes between particular types of respondents (Gubrium & Holstein, 2002). Therefore, potential participants for the semi-structured interviews should be people who have at least one year's experience working in companies. Recruitment occurred across the whole of the United Kingdom.

The snowball sampling technique was employed. The snowball sampling method yields a study sample through referrals made among people who know of others who possess certain characteristics that are of research interest (Biernacki & Waldorf, 1981).

Potential participants were contacted by telephone or email, and the research purpose and procedure were explained briefly (See Appendix 5).

Potential participants expressing interest in the research were given participant information sheets (See Appendix 6). Opportunities and time to ask questions about the research were given before completing the consent form (See Appendix 7).

Once the participants agreed to take part in the research and sent the consent forms back, the recruitment procedure is finished. An interview would be
arranged at a time and place appropriate and convenient for the participant and the research.

The point of data saturation was considered to be reached after conducting the 11th interview, as there was no new information emerging with respect to the research concern (Given, 2008). An additional interview was conducted afterwards, which further confirmed that data saturation had occurred, as there was still no new information emerging with regard to the research concern. Therefore, the data collection procedure in this stage was stopped. 12 semi-structured interviews were conducted in total.

6.3 Design of Semi-structured Interview

Although interviews can be conducted by telephone, email or letter, due to the nature of this research, face-to-face interview was preferred. The reasons for this were because there were a relatively small number of people involved, and as the recruitments were to occur across the United Kingdom, most of the potential interviewees would be accessible. Moreover, because most of the questions are open-ended, being face to face with the interviewees would make it easier to get extended responses and further insight and an in-depth understanding of the salient issues (Gillham, 2000).

Semi-structured interviews were audio recorded, as agreed upon by the interviewees prior to participation. Interviews combined open and closed questions to explore insights and understanding while still concentrating on the research topic.

All the audio recordings of interviews were transcribed. All identifying information such as names were removed from the transcripts. The data was
analysed thematically to construct themes and then the results will be validated by questionnaires.

Ethic approval had been granted by the University of Manchester before conducting the interview process to ensure the research was ethically sound. Voluntary participation, informed consent, confidentiality, anonymity and privacy are guaranteed.

6.4 Process of Semi-structured Interview

*Number of participants:* 12 interviewees.

*Duration:* Up to one hour.

*Objectives:*

- Gather detailed information from the interviewees’ working experiences about the incentives for innovation and the situation in which these incentives could arise.
- Discuss the interviewees’ working experiences in innovation and game changing in business.
- Expand the topic for further research.

However, due to the nature of semi-structured interviews, the order and the exact content of interview questions would be determined by the trend of the conversation (Bryman, 2008). The following design and topics serve as a guide only.
| Introduction | • Greet the interviewee and introduce myself.  
• Briefly explain the background and the purpose of the research.  
• Briefly explain the process of the interview. |
| Background | • Tell me a bit about your work and the company you are working for.  
• Why are you interest in this research?  
• Do you think innovation is important for your company’s business?  
• Do you have any working experience in innovation? Has your company engaged in or tried to engage in innovation?  
• Explain the concept of game theory and game changing. |
| Opening up and opening out phase | • Is there a dominant leader in the market in which your company is operating?  
  • If yes: What can your company do in order to survive and grow in the market?  
  • If no: What do you think your company can do in order to capture more market share or even become the market leader?  
• How is competition in the market? Are there many competitors? Or are there only a few but major competitors?  
  • If many: How can your company stand out from all these competitors?  
  • If a few major: What can your company do in order to overtake these competitors?  
• Is your company under the pressure of expanding the existing market or increasing sales? Is the current market shrinking or overcrowded?  
  • How can your company expand the existing market and bring more potential customers?  
• Has the trend in the market where your company is operating changed? If so, has your company adapted to the change?  
  • If yes: How did your company adapt to the change?  
  • If no: Why not? What can your company do now in order to make up or catch up?  
• Is your company a newcomer to the market?  
  • What did your company do in order to survive and grow in the new market?  
  • Did your company avoid head-to-head competition with incumbents? If yes: How? If no: Why not? What happened in the competition?  
• Does your company need to re-establish its reputation or build a new brand image?  
  • What can your company do in order to re-establish its reputation or build a new brand image?  
• Has your company thought about co-operation with others in innovation? |
• If yes: Why?
• If no: Why not?

Summary and closure

• What do you think about using innovation to change the game business?
• How useful do you think this concept is?
• Will you consider using this concept in your work?
• Close the interview by thanking the participant for his/her time and enquire whether there was anything else he/she would like to ask.

Table 6.1. Design of the Semi-structured interview

6.5 Strategy of Transcription

In order to make the interview data available in textual form for subsequent coding and analysis, the recorded interviews were transcribed verbatim. A sample of the transcripts can be found in Appendix 8.

However, according to Gubrium & Holstein (2002), there are several problems that may occur during the process of transcription, including misunderstanding the sentence structure, the use of quotation marks when participants are paraphrasing others, omissions, and mistaking words or phrases for others.

In order to overcome these problems and minimise errors in transcribing, several strategies were employed for the purpose of enhancing transcription quality. They include maximising the recording quality, flagging ambiguity in the interview, using consistent notation systems, reviewing the transcription, and using member check (Gubrium & Holstein, 2002).

6.6 Analysis Strategy of Semi-structured Interview

In order to make sense of the interview transcripts, the coding approach was employed. Coding is a way of indexing or categorising the text in order to establish a framework of thematic ideas (Gibbs, 2007). It involves identifying
and recording one or more passages of text exemplifying the same theoretical or descriptive data and then linking them with a name for that idea, which is called the code.

Grounded theory, which is one of the most commonly used approaches to coding, was employed for analysing the transcribed interviews in this research. It is an approach that focuses on inductively generating theoretical ideas and themes from the data, involving the coding of the interview transcript in terms of key concepts (Blaxter et al. 2010).

Grounded theory analysis is a style of analysis that uses procedures to develop a theory grounded in the data (Punch, 2005). By following the grounded theory approach, as the research process unfolds, a clearer identification and understanding of the relevant concepts will be reached.

The approach of grounded theory analysis, as suggested by Goulding (2002), is particularly helpful for the researcher to analyse and explain behaviours. As the main concern of this research concerns interactions between various players in the game of business, a grounded theory strategy can be useful in terms of exploring and explaining a wide range of issues that might arise in the process of data analysis.

The reason for using grounded theory as the analysis strategy for the interviews is due to the nature and the design of this research, as the purpose of the interview is to further explore the topic of interest and generate findings so that a conceptual framework can be developed. Although the case study in the previous stage generated some initial findings, its main purpose was to form the base of the interview questions and to provide guidance for the
following research. Moreover, the findings from the case study are mainly from documentary data, which is secondary data. In order to explore the research issues and answer the research questions, while also enhancing the credibility and reliability of the research, further findings need to be developed from primary data collected through semi-structured interviews.

Figure 6.1. Analysis Strategy of the Semi-structured interview

The analysis strategy for the interview data was designed as shown in Figure 6.1. Grounded theory coding is a data analysis procedure for generating findings based on interview transcripts (Auerbach & Silverstein, 2003).

In the process of the grounded theory coding, raw text (interview transcripts) is first searched for relevant text, which is the text that is considered relevant to the research concern (Auerbach & Silverstein, 2003). Similar or identical ideas in the relevant text expressed by different participants are categorised together, and are known as the repeating idea. Then themes, which are implicit topics that organise groups of repeating ideas, are formed (Auerbach
& Silverstein, 2003). Afterwards, themes are organised into larger, more abstract ideas, which are referred to as theoretical constructs. They are the abstract grouping of themes (Auerbach & Silverstein, 2003). Finally, theoretical constructs are organised into a theoretical narrative, which summarises what has been learned about the research concern (Auerbach & Silverstein, 2003). More details can be seen in Figure 6.2.

---

**MAKING THE TEXT MANAGEABLE**
1. Explicitly state the research concern and theoretical framework at the beginning.
2. Select the relevant text for further analysis. Do this by reading through the raw text with Step 1 in mind, and highlighting relevant text.

**HEARING WHAT WAS SAID**
3. Record repeating ideas by grouping together related passages of relevant text.
4. Organize themes by grouping repeating ideas into coherent categories.

**DEVELOPING THEORY**
5. Develop theoretical constructs by grouping themes into more abstract concepts consistent with the theoretical framework.
6. Create a theoretical narrative by retelling the participant’s story in terms of the theoretical constructs.

*Figure 6.2. Six Steps for Analysis of the Semi-structured interview*(Auerbach & Silverstein, 2003)

### 6.7 Analysis of Semi-structured interview

There are 490 relevant texts highlighted from the 12 original interview transcripts that are considered to be in line with the research concerns. All the relevant texts are tagged in accordance with the code that is assigned to the interviewee from which the text is selected. By going through all the relevant texts, ideas that are expressed by two or more research participants are grouped together. There are 89 groups of repeating ideas with headings that
express the essence of each repeating idea. In the next step, the repeating ideas need to be organised into themes. At this stage, the process of sensitising concept takes place in order to make the repeating ideas more approachable so that themes can be formed with the headings that reflect the game theoretical framework (See Table 6.2).

<table>
<thead>
<tr>
<th>THEME</th>
<th>PERCENTAGE (N =12)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme 1. Signals to innovate</strong></td>
<td></td>
</tr>
<tr>
<td>1. Uncertainty in the market</td>
<td>67%</td>
</tr>
<tr>
<td>2. Supportive attitude in the market/industry</td>
<td>33%</td>
</tr>
<tr>
<td>3. Recession trigger</td>
<td>92%</td>
</tr>
<tr>
<td>4. Changes in the current market</td>
<td>92%</td>
</tr>
<tr>
<td>5. Changes in law &amp; regulation</td>
<td>33%</td>
</tr>
<tr>
<td>6. Effective patent protection exists</td>
<td>25%</td>
</tr>
<tr>
<td>7. Market saturation and market limitation appear</td>
<td>83%</td>
</tr>
<tr>
<td>8. There are meet the unmet needs and gaps in the supply &amp; demand</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Theme 2. Interaction with competitors</strong></td>
<td></td>
</tr>
<tr>
<td>9. To compete with others</td>
<td>92%</td>
</tr>
<tr>
<td>10. To avoid direct competition</td>
<td>33%</td>
</tr>
<tr>
<td>11. To develop competitive advantage</td>
<td>92%</td>
</tr>
<tr>
<td>12. To stand out and be different</td>
<td>58%</td>
</tr>
<tr>
<td>13. To stay ahead and be the first mover</td>
<td>67%</td>
</tr>
<tr>
<td>14. To cope with imitation</td>
<td>25%</td>
</tr>
<tr>
<td>15. To gain more market share and maintain market position</td>
<td>58%</td>
</tr>
<tr>
<td></td>
<td>Question</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>16.</td>
<td>To switch focus and change targeted market to find more opportunities</td>
</tr>
</tbody>
</table>

**Theme 3. Interaction with customers**

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>To meet customers’ expectations</td>
<td>58%</td>
</tr>
<tr>
<td>18.</td>
<td>Stable customer base provides foundation for innovation</td>
<td>42%</td>
</tr>
<tr>
<td>19.</td>
<td>To establish a good relationship with customers</td>
<td>58%</td>
</tr>
<tr>
<td>20.</td>
<td>To attract more customers</td>
<td>58%</td>
</tr>
</tbody>
</table>

**Theme 4. Interaction within the company**

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>Open culture and encouraging attitude</td>
<td>25%</td>
</tr>
<tr>
<td>22.</td>
<td>Strategic choice</td>
<td>67%</td>
</tr>
<tr>
<td>23.</td>
<td>Innovation embraced in the company’s strategy</td>
<td>58%</td>
</tr>
<tr>
<td>24.</td>
<td>The size of the company influences</td>
<td>42%</td>
</tr>
<tr>
<td>25.</td>
<td>Short term and long term strategy orientation</td>
<td>50%</td>
</tr>
<tr>
<td>26.</td>
<td>Manage and control the risk of innovation</td>
<td>75%</td>
</tr>
<tr>
<td>27.</td>
<td>To balance the risk/reward of innovation</td>
<td>58%</td>
</tr>
<tr>
<td>28.</td>
<td>To establish and maintain reputation of the company</td>
<td>75%</td>
</tr>
<tr>
<td>29.</td>
<td>The company’s confidence towards innovation</td>
<td>75%</td>
</tr>
<tr>
<td>30.</td>
<td>Profit incentive</td>
<td>75%</td>
</tr>
<tr>
<td>31.</td>
<td>To improve the company’s capacity</td>
<td>25%</td>
</tr>
<tr>
<td>32.</td>
<td>To develop and enhance the company’s core values</td>
<td>50%</td>
</tr>
<tr>
<td>33.</td>
<td>Product value incentives</td>
<td>25%</td>
</tr>
</tbody>
</table>

**Theme 5. Change the game by changing the players**

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.</td>
<td>Avoid head-on competition</td>
<td>33%</td>
</tr>
<tr>
<td>35.</td>
<td>Create new demand to bring more customers and also avoid competition with the existing players</td>
<td>25%</td>
</tr>
<tr>
<td>36. Expand to new market regions/segments for more customers and change the players in the game</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>37. Newcomers could change the existing game that the company has been playing</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>38. Go to emerging market and leave the current players behind</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>39. Competitors can be co-operators</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>40. Be the first mover and fill in the gap in the demand</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>41. Switch targeted market for more customers and fewer competitors</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>

**Theme 6. Change the game by changing the added value**

| 42. Find the best way to use the company’s competitive advantage | 92% |
| 43. Differentiate from others and offer different value | 58% |
| 44. Being the first mover could provide temporary monopoly profit | 67% |
| 45. Reputation gives the company extra edge to innovate | 75% |
| 46. Bring the company’s advantage to the new market | 83% |
| 47. Improve the company’s capacity and push the company forward | 25% |
| 48. Secure exclusivity | 50% |
| 49. Establish core values and identity of the company | 50% |
| 50. Meet the unmet demands | 50% |

**Theme 7. Change the game by changing the rules**

<p>| 51. Avoid head-on competition | 33% |
| 52. Find a way to be different from others | 58% |
| 53. Adapt the changes in rules | 92% |
| 54. Set the new rules as the first mover/as the leader | 46% |
| 55. Adapt the changes in laws and regulations | 33% |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>56. Be the newcomer and change the existing rules</td>
<td>33%</td>
</tr>
<tr>
<td>57. Head-on competition is not always necessary</td>
<td>42%</td>
</tr>
<tr>
<td>58. Shift targeted market to leave the current rules behind</td>
<td>17%</td>
</tr>
<tr>
<td>59. To work towards win/win in the industry, not lose/lose</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Theme 8. Change the game by changing the tactics**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>60. Compete to the company’s advantage, not that of the rivals</td>
<td>92%</td>
</tr>
<tr>
<td>61. Reputation to influence competitors and customers’ perception of the company</td>
<td>75%</td>
</tr>
<tr>
<td>62. Continuous innovation to keep ahead and prepare for changes</td>
<td>75%</td>
</tr>
<tr>
<td>63. Boost confidence for the company as well as the customers</td>
<td>92%</td>
</tr>
<tr>
<td>64. Competing in the general market as well as securing the exclusive market</td>
<td>50%</td>
</tr>
<tr>
<td>65. Outsourcing innovation to achieve efficiency</td>
<td>25%</td>
</tr>
<tr>
<td>66. Switch focus and change targeted market to get away from the current competition and find more opportunities</td>
<td>25%</td>
</tr>
<tr>
<td>67. Discover mutual goals and work towards win/win</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Theme 9. Change the game by changing the scope**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>68. Create new demands and open new market segments</td>
<td>25%</td>
</tr>
<tr>
<td>69. Expand the boundary of the market by moving to new regions/new segment of the market</td>
<td>67%</td>
</tr>
<tr>
<td>70. Newcomers and emerging market could expand the current market</td>
<td>83%</td>
</tr>
<tr>
<td>71. Get access to new market through cooperation</td>
<td>42%</td>
</tr>
</tbody>
</table>
72. Fill in the gap in supply and demand and raise the new market 50%

**Theme 10. The reasons for cooperation in innovation**

| 73. Market access                     | 42% |
| 74. Access to resources & expertise   | 67% |
| 75. Reduce risks & costs              | 58% |
| 76. Achieve win/win situation         | 58% |
| 77. Adapt changes in the industry     | 33% |
| 78. Crystallised ideas                | 10% |

**Theme 11. Innovation dilemma**

| 79. Lose core values by diversifying too much | 42% |
| 80. Innovate for the sake of innovation     | 50% |
| 81. Everyone spends more in innovation with no guarantee of more profits | 42% |

**Theme 12. Barriers to innovation**

| 82. Conservative and risk averse         | 50% |
| 83. Risks of innovation                  | 75% |
| 84. Costs                                | 42% |
| 85. Uncertainty                          | 33% |
| 86. Resistance to change                 | 33% |
| 87. Ineffective legal protection         | 25% |
| 88. Limitation of capacity               | 42% |
| 89. Strategic choice of the company      | 25% |

**Table 6.2. Sensitising Concept of the Semi-structured interview**

As shown in Table 6.2, there are 12 themes established, each with several subheadings that reflect the contents of the themes. The frequency represents the percentage of participants in the research who expressed the
relevant concept (N=12). Theoretical constructs are then prepared by organising the themes into 5 headings that fit the conception framework this study is intending to establish. The defined theoretical constructs are as follows:

<table>
<thead>
<tr>
<th>Theoretical constructs</th>
<th>Number of Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Signals to innovate</td>
<td>1</td>
</tr>
<tr>
<td>2. Incentives for innovation: From interaction</td>
<td>3</td>
</tr>
<tr>
<td>3. Incentives for innovation: From game changing</td>
<td>5</td>
</tr>
<tr>
<td>4. Cooperation in innovation</td>
<td>1</td>
</tr>
<tr>
<td>5. Problems in innovation</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total:</strong> 12</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6.3. Theoretical Constructs of the Semi-structured interview**

The overall analysis process of the interviews is as follows:

**Figure 6.3. Analysis Process of the Semi-structured interviews**

Finally, the theoretical narrative is prepared to present the findings from the research participants in a way that illustrates the abstract theoretical constructs comprehensively by referring to the interviewees’ own words to interpret each theme presented.
6.8 Results and Summary of Semi-structured interview

6.8.1 Theoretical Narrative of Semi-structured interview

In order to build a conceptual framework from the perspective of strategic management and apply game theory to innovation management to identify the incentives that could possibly encourage companies to engage in innovation, the interviews are designed to gather data about the signals to innovate, the incentives for innovation, and the situation in which these incentives could arise.

Changes in the market could give rise to the signals to innovation where “a gap appears in the market that is not met by others”, or “the trend in the market has changed”, and also when “the recession makes the company think differently”.

In terms of the incentives for innovation, the research participants presented their opinions from different perspectives. Incentives for innovation could arise from interactions with other companies through “fierce competition” and being “aware of the competitors’ moves”, or “to avoid head-on competition” and “to compete with fewer rivals”. Interactions with customers could also raise the incentives as the company will try to “meet various customers’ needs”, “attract their attention and get them interested”, or even try to “raise their expectation and create new demand from the ground”. Incentives could also arise from the internal interactions of the company brought about by “open culture”, “strategic choice”, and “the core value of the company”.
Incentives for innovation can also arise from changing the current game. Innovation, especially the strategic function of it, can change the game of business by altering at least one element of the PARTS value net as suggested by Brandenburger and Nalebuff (1996), and thus bring benefits and opportunities to the company. Players in the game can be changed by moving to a less competitive segment with “fewer competitors” or by turning the competitors into “partners with mutual goals”. The added value of the company can be changed through “establishing new competitive advantage” or just simply by finding a “new way to use the existing competitive advantage” of the company. Changes in the external environment such as changes in laws and regulations and changes in market trends can also modify the rules of the game as too can the company’s choice of strategy such as “shifting targeted market” or pursuing a “win/win situation”. The company could vary the tactics by “continuous innovation”, “securing exclusivity”, and “boosting customers’ confidence”. The scope of the game could be changed through “moving to new regions”, “expanding to new market segments”, and “creating new demands”. By altering any one of the five elements, the original game is changed and as a result, a new game starts.

While emphasising the importance of innovation, the research participants were also concerned that in the pursuit of innovation the company might “lose its core values by diversifying too much”, or just “innovate for the sake of innovation with no clear objective about how to use it to make sustainable profits”. The competition could “force everyone to spend more in innovation but with no guarantee of more profits”. Without clear goals and a thorough
plan, pursuing innovation blindly could put companies in an innovation dilemma and lead to a lose/lose situation.

In addition, research participants also expressed their concerns about innovation. They felt “people are normally risk averse” and “do not like uncertainly”, especially when it involves “extra costs with no guaranteed rewards”. Furthermore, if “the old way still works” there is “no point in trying the new one”. “Ineffective patent protection” and “short term profit driven strategy” could also stop companies being innovative. As a result, innovation is sometimes seen as a “last resort”, only being chosen when there are “no other options”.

To cope with the risk and uncertainty associated with innovation, cooperation appears to be an effective method as suggested by the research participants. Through cooperation, “the costs and risks of innovation can be shared”, but can also “provide access to the new market areas” and “other participators’ expertise” as well. “Competition and cooperation can exist at the same time”. With mutual objectives, cooperation can “lead to a possible win/win situation” for all the players.

6.8.2 Concept Map for Findings from the Semi-structured interview Study

The semi-structured interviews are the extensions of the case studies. They were designed to investigate the incentives for innovation in more specific detail by following the concept map formed on the basis of the case studies.

Eight possible signals are identified for the need to innovate. The incentives for innovation identified through interviews are categorised in two
perspectives: from interaction and from changing the current game. The interviews identified the situation of innovation dilemma as well as the barriers to innovation. The significance of cooperation in innovation is further explored. Based on the findings of the interviews, the initial concept map is generated, which forms the preliminary conceptual framework this study attempts to establish.

![Concept map of Findings of the Semi-structured interview](image)

**Figure 6.4.** Concept map of Findings of the Semi-structured interview
Chapter 7: Questionnaire

Brief

This chapter describes the data collection and analysis of the questionnaire. The substantial content can be divided into the following five stages.

• To illustrate the criteria for the sample selection of the questionnaire in section 7.2.
• To present and discuss the design of the questionnaire in detail in section 7.3.
• To outline and explain the analysis strategy of the questionnaire in section 7.4.
• To conduct the analysis of the questionnaire in section 7.5.
• To conclude and illustrate the findings of the questionnaire in section 7.6.

The purpose of the questionnaire is to validate and generalise the findings from the semi-structured interview. Through questionnaire, the reliability and validity of the research results are enhanced.
7.1 Introduction

The final stage of the data collection procedure is questionnaires. It is one of the most widely used social research techniques (Blaxter et al. 2010). Questionnaires are one of the data collection approaches usually adopted by the quantitative research method. However, as the methodology of this research employed a mixed methods approach, the QUAL sequential mixed methods in particular, which means the qualitative component is the main data-collection approach and the quantitative component is for validation only, questionnaires will be employed to enhance the reliability and validity of the research findings (Bryman, 2008).

The advantage of questionnaires is that it allows for the collection of a large amount of data from a population and the data collection is standardised, allowing for easy comparisons (Saunders et al. 2009). The qualitative approach, such as case studies and interviews that are conducted in the early stage, only collected data from a relatively small sample. Without validating the data in a larger sample, the research findings are not credible. Therefore, triangulation is necessary.

According to Jick (1979), triangulation refers to the use of different data collection techniques within one research in order to ensure that the data is credible. In order to generalise the research findings to a population, a quantitative approach such as questionnaires is essential in terms of testing and verifying. Gathering multiple forms of both qualitative and quantitative data can help test and validate the data collected, which cannot be achieved by relying on a single data source. Through questionnaires, data collected
from the case studies and interviews can be further organised into categories and themes, which could improve the credibility and consistency of the data.

7.2 Sample Selection

Sampling decisions:

- The eligible age of the respondents: 18 and above.
- The geographic area of the respondents: United Kingdom.
- Sample size: Around 100.
- Sampling frame: Snowball sampling. Mainly through the university contact list and personal contacts.

In terms of sample size, there is no formal sample size calculation technique employed. This is because the questionnaires are merely a validation for the interviews and will not generate any new findings on their own. The number of participants was decided based on relevant literature review and reasonable assumption. Snowball sampling, which is a technique that relies on previously identified respondents to identify other potential respondents, was applied to get in touch with as many respondents as possible (Fink, 1995).

As the target population of the research is people who have had working experience in organisations for at least one year, the sampling for this research will be non-probability sampling, which means samples are chosen based on judgment regarding the characteristics of the target population and the needs of the questionnaires (Czaja & Blair, 2005). This is why the sampling frame was mainly through the university contact list and personal contacts of the researcher. Potential participants were contacted by email and
a covering letter was sent, explaining the research purpose and procedure briefly (See Appendix 9).

Potential participants expressing interest in participating in the research were given the participant information sheets (See Appendix 10). Opportunities and time to ask questions about the research were also given before completing the consent form (See Appendix 11). Once the participants agreed to take part in the research and sent the consent forms back, the recruitment procedure ended.

Ethic approval had been granted by the University of Manchester before conducting the survey process to ensure the research was ethically sound. Voluntary participation, informed consent, confidentiality, anonymity and privacy are guaranteed.

### 7.3 Design of Questionnaire

The objectives of the questionnaires are:

- Validate the findings from the previous stages;
- Generalise the results of the research to a larger population;
- Standardise the findings to improve the consistency of the results.
- Triangulation to enhance the reliability and credibility of the research.

#### 7.3.1 Administration of Questionnaire

The type of the questionnaire was self-administered, in which respondents answer questions by completing the questionnaires by themselves (Bryman, 2008).
The questionnaires were administered electronically using the Internet. This is known as an Internet-mediated questionnaire (Saunders et al. 2009). The main advantage of using the Internet-mediated questionnaires is the time taken to complete the collection. It usually takes around two to six weeks from distribution (Saunders et al. 2009).

Another reason for choosing this method is because the type of questions that were asked in the questionnaires was closed-ended and also they were not too complicated and so were suitable for using the computer-based technique.

7.3.2 Design of Individual Questions

Individual questions were in the form of closed-ended questions, providing a number of alternative answers from which the respondent is instructed to choose (Dillman, 2007). List questions were used to obtain answers. They are questions that offer respondent a list of responses, any of which they can choose (Corbetta, 2003). There were a mix of single-choice questions and multiple-choice questions depending on the nature of each question.

The questionnaire was designed according to the findings from the interviews. The format followed the themes concluded from the interview analysis. A sample of the questionnaire can be found in Appendix 12.

Due to the nature of questionnaire, complicated questions that could cause confusion for the participants would not be asked. The concept of changing the game through innovation by changing at least one element of PARTS requires thorough introduction and explanation, which is not applicable through questionnaire, and therefore would not be asked on the questionnaire.
7.3.3 Evaluation of Questionnaire

Validity
A valid questionnaire means accurate data are collected so the questions measure what they are intended to measure. The question must be understood by the respondent in the way intended by the researcher and the answer given by the respondent must be understood by the researcher in the way intended by the respondent (Foddy, 1994). There are three basic ways to assess validity (Saunders et al. 2009).

Content Validity: This approach refers to the extent to which the measurement questions in the questionnaire provide adequate coverage of the investigative questions. This approach is acceptable, as the purpose of the questionnaire is to validate findings from the previous research; the questions would follow the themes developed from the interviews, apart from the game changing part, so that the questionnaire measures what it is intended to measure.

Criterion-related validity: This approach concerns the ability of the questions to make accurate predictions. However, the purpose of the questionnaire in the research is not to predict or make any new assumption, it is to validate the results from the previous research. Therefore this approach is irrelevant.

Construct Validity: This approach evaluates the extent to which the measurement questions conform with theoretical expectations. This approach, similarly to the criterion-related approach, is not relevant for this research, as it does not match the purpose of this questionnaire.
Reliability

Reliability refers to consistency (Foddy, 1994). A reliable measurement is one where the same results can be obtained on repeated occasions (Vaus, 1996). Mitchell (1996) suggests that comparing data collected from a variety of sources can enhance reliability. As the format of the questionnaire followed the themes generated from the interview, comparison of the frequency obtained from the two studies can help to achieve a sound reliability.

7.4 Analysis Strategy of Questionnaire

Results of the questionnaires are analysed and presented in such a way as to show whether a reasonable level of the researched population agreed with findings from the previous research. The questionnaire is for generalisation and validation only; no new findings would arise from results of the questionnaire. The analysis procedure is as following:

- Coding

Coding is the process of converting answers to numbers and classifying answers (Louie & Glimcher, 2012). The coding scheme is designed at the same time as the questionnaire where a set of fixed responses is provided to respondents.

- Entering data

The data were collected through e-mails. The researcher input the data into Microsoft Excel for subsequent analysis purpose.

- Statistical test
For the five single-choice questions, Pearson’s Chi-squared test is applied to test whether there are significant differences between each type of answer for the five questions. This could determine whether or not the results are valid.

For the seven multiple-choice questions, descriptive statistics are applied. Mean and standard deviation are calculated in order to determine the lower bound of acceptation (mean minus standard deviation). Answers below the lower bound are put aside as weak views, which might be rejected or merged with other concepts at the final stage.

- **Summarisation**

To summarise the data for individual variables so that specific values can be presented, table illustration will be used. A table can summarise the proportion of occurrences, which is the frequency, of each question (Saunders et al. 2009). By means of this, the results of the questionnaires can be straightforward and easy to observe.

Therefore, by following the process as shown below in **Figure 7.1**, findings from the previous research can be generalised and validated. The conceptual framework formed from the previous stages can be revised and refined.
7.5 Analysis of Questionnaire

200 questionnaires were sent out, and 119 valid questionnaires were returned. Thus, a 59.5% response rate was achieved. This is probably due to the snowball sampling method, as it is a method that yields sample through referrals made among people who know of others who possess some characteristics that are of interest to the research (Biernacki & Waldorf, 1981).

7.5.1 Pearson’s Chi-squared Test for the Single-Choice Questions

Question 1, 3, 5, 7, and 11 are single-choice questions asking respondents’ opinions on whether they agree, are uncertain or disagree with the questions listed. If they agree or are uncertain, the respondent can move to the following
multiple-choice question. If they disagree, the respondent can move to the next single-choice question.

The results are displayed in the following table.

<table>
<thead>
<tr>
<th>Number of Question</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: Incentives from interaction with competitors</td>
<td>102</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Percentage (N=119)</td>
<td>86%</td>
<td>10%</td>
<td>4%</td>
</tr>
<tr>
<td>Q3: Incentives from interaction with customers</td>
<td>103</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Percentage (N=119)</td>
<td>87%</td>
<td>11%</td>
<td>2%</td>
</tr>
<tr>
<td>Q5: Signals to the need of innovation</td>
<td>95</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Percentage (N=119)</td>
<td>80%</td>
<td>18%</td>
<td>2%</td>
</tr>
<tr>
<td>Q7: Incentives from interaction with internal environment</td>
<td>92</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Percentage (N=119)</td>
<td>77%</td>
<td>17%</td>
<td>6%</td>
</tr>
<tr>
<td>Q11: Cooperation in innovation is an effective method to remove barriers</td>
<td>74</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Percentage (N=119)</td>
<td>62%</td>
<td>29%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Table 7.1: Results for the Single-Choice Questions

For all five questions, the percentages for *Agree* are over 50%, and for *Disagree* are less than 10%. In order to test whether there is actual significant difference between *Agree*, *Uncertain*, and *Disagree*, the Chi-squared test is applied in the following procedures:
• $H_0$: There is no significant difference between *Agree*, *Uncertain*, and *Disagree* for the five questions.

• Df (Degrees of freedom) $=(r-1) \times (c-1) = (5-1) \times (3-1) = 8$.

• Significant level: $\alpha=0.05$

• The critical $\chi^2$ value $=15.51$

  (With $\alpha=0.05$ and df $= 8$)

• Rejection region: If the calculated $\chi^2 > 15.51$, then $H_0$ is rejected, otherwise $H_0$ is accepted.

The observed data is:

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>102</td>
<td>12</td>
<td>5</td>
<td>119</td>
</tr>
<tr>
<td>Q3</td>
<td>103</td>
<td>13</td>
<td>3</td>
<td>119</td>
</tr>
<tr>
<td>Q5</td>
<td>95</td>
<td>21</td>
<td>3</td>
<td>119</td>
</tr>
<tr>
<td>Q7</td>
<td>92</td>
<td>20</td>
<td>7</td>
<td>119</td>
</tr>
<tr>
<td>Q11</td>
<td>74</td>
<td>34</td>
<td>11</td>
<td>119</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>466</strong></td>
<td><strong>100</strong></td>
<td><strong>29</strong></td>
<td><strong>595</strong></td>
</tr>
</tbody>
</table>

*Table 7.2. Observed Data of the Single-Choice Questions*

The theoretical frequency of the expected value is calculated as:

$$E_{i,j} = \frac{\left( \sum_{n_r=1}^{c} O_{i,n_r} \right) \cdot \left( \sum_{n_c=1}^{r} O_{n_c,j} \right)}{N},$$

Where

- $r$ = rows;
- $c$ = columns;
- $O_i$= an observed value;
- $E_{i,j}$= an expected (theoretical) value, asserted by $H_0$;
- $n$= the number of cells in the table;
- $N$= Total sample size (the sum of all cells in the table).
The results are:

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>93.2</td>
<td>20</td>
<td>5.8</td>
<td>119</td>
</tr>
<tr>
<td>Q3</td>
<td>93.2</td>
<td>20</td>
<td>5.8</td>
<td>119</td>
</tr>
<tr>
<td>Q5</td>
<td>93.2</td>
<td>20</td>
<td>5.8</td>
<td>119</td>
</tr>
<tr>
<td>Q7</td>
<td>93.2</td>
<td>20</td>
<td>5.8</td>
<td>119</td>
</tr>
<tr>
<td>Q11</td>
<td>93.2</td>
<td>20</td>
<td>5.8</td>
<td>119</td>
</tr>
<tr>
<td>Total</td>
<td>466</td>
<td>100</td>
<td>29</td>
<td>595</td>
</tr>
</tbody>
</table>

**Table 7.3. Expected Data of the Single-Choice Questions**

The value of test-statistic is calculated as:

\[
\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(O_{i,j} - E_{i,j})^2}{E_{i,j}}.
\]

The results are:

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>0.830901288</td>
<td>3.2</td>
<td>0.110344828</td>
<td>4.141246115</td>
</tr>
<tr>
<td>Q3</td>
<td>1.030472103</td>
<td>2.45</td>
<td>1.351724138</td>
<td>4.832196241</td>
</tr>
<tr>
<td>Q5</td>
<td>0.034763948</td>
<td>0.05</td>
<td>1.351724138</td>
<td>1.436488086</td>
</tr>
<tr>
<td>Q7</td>
<td>0.015450644</td>
<td>0.248275862</td>
<td>0.263726506</td>
<td></td>
</tr>
<tr>
<td>Q11</td>
<td>3.955364807</td>
<td>9.8</td>
<td>4.662068966</td>
<td>18.41743377</td>
</tr>
<tr>
<td>Total</td>
<td>5.86695279</td>
<td>15.5</td>
<td>7.724137931</td>
<td><strong>29.09109072</strong></td>
</tr>
</tbody>
</table>

**Table 7.4. Test-Statistic of the Single-Choice Questions**

The calculated \( \chi^2 = 29.0910 > 15.51 \), which is the critical value of \( \chi^2 \), so that \( H_0 \) is rejected.

There is a significant difference between *Agree*, *Uncertain*, and *Disagree* for the five questions.

Considering all five questions, the percentages for *Agree* are over 50%. *Agree* is accepted as the valid answer for the five single-choice questions.
7.5.2 Descriptive Statistics for the Multiple-Choice Questions

Question 2, 4, 6, 8, 9, 10, and 12 are multiple-choice questions, and respondents can choose as many as they prefer if they agree with the answers listed. Apart from questions 9 and 10, all the other questions are associated with the single-choice questions. If the respondent disagrees with the previous single-choice question, then the following multiple-choice is skipped.

The results for each question are displayed in the following tables:

<table>
<thead>
<tr>
<th>Q2: Incentives that could arise from interacting with competitors</th>
<th>Frequency</th>
<th>Percentage (N=114)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To compete with others</td>
<td>72</td>
<td>63%</td>
</tr>
<tr>
<td>To avoid direct competition with others</td>
<td>38</td>
<td>28%</td>
</tr>
<tr>
<td>To develop the company’s own advantages over others</td>
<td>89</td>
<td>78%</td>
</tr>
<tr>
<td>To stand out from others and be different</td>
<td>88</td>
<td>77%</td>
</tr>
<tr>
<td>To stay ahead and be the first mover in the market</td>
<td>89</td>
<td>78%</td>
</tr>
<tr>
<td>To gain more market share and maintain the company’s market position</td>
<td>67</td>
<td>59%</td>
</tr>
<tr>
<td>To switch market focus and targeted market</td>
<td>58</td>
<td>51%</td>
</tr>
<tr>
<td>To cope with imitation</td>
<td>43</td>
<td>38%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean</th>
<th>68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Deviation</td>
<td>19.1181</td>
</tr>
</tbody>
</table>

Table 7.5. Results of Q2

The lower bound of acceptation = 68-19 = 49. The following two answers are put aside.
Table 7.6. Answers below the Lower Bound of Acceptance: Q2

Avoiding direct competition can be considered as the broader concept for standing out, differentiation, and switching targeted market, as they are all about making the current competition irrelevant. However, the concept may be too broad to be considered as an incentive. Therefore it is removed from the list of incentives but will be discussed in the next chapter as a broad concept including other specific incentives.

In terms of coping with imitation, there is no other concept that overlaps with it. Considering that the percentage of frequency is low in both semi-structured interview (25%) and questionnaires (38%), it is excluded from the list of incentives.

<table>
<thead>
<tr>
<th>Answers below the lower bound</th>
<th>Frequency</th>
<th>Percentage (N=114)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To avoid direct competition with others</td>
<td>38</td>
<td>28%</td>
</tr>
<tr>
<td>To cope with imitation</td>
<td>43</td>
<td>38%</td>
</tr>
</tbody>
</table>

Table 7.7. Results of Q4

The lower bound of acceptance = 78 - 12 = 66. The following one answer is put aside.
Stable customer base could give rise to the confidence to innovate

Table 7.8. Answers below the Lower Bound of Acceptance: Q4

Although the answer is below the lower bound of acceptance, the percentage of frequency is still over 50%, in line with the percentage of frequency in the semi-structured interviews (50%). Therefore, stable customer base is still included in the list of incentives.

Table 7.9. Results of Q6

The lower bound of acceptance = 60-13 = 47. The following one answer is put aside.
Recession can be seen as change in the external market environment, as it is a force coming from outside the company and is out of the company’s control. Therefore, recession trigger is removed as an individual incentive from the list, but will be included in the concept of adapting to market changes and will be discussed in the next chapter.

### Q8: Incentives that could arise from interacting with internal environment

<table>
<thead>
<tr>
<th>Incentive</th>
<th>Frequency</th>
<th>Percentage (N =112)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open culture and encouraging attitude inside the company</td>
<td>88</td>
<td>79%</td>
</tr>
<tr>
<td>Strategic choice of the company</td>
<td>64</td>
<td>57%</td>
</tr>
<tr>
<td>Big company with more resources</td>
<td>57</td>
<td>51%</td>
</tr>
<tr>
<td>Small company with more flexibility</td>
<td>43</td>
<td>38%</td>
</tr>
<tr>
<td>Short term strategy focus: to be flexible</td>
<td>41</td>
<td>37%</td>
</tr>
<tr>
<td>Long term strategy focus: benefit in the long term</td>
<td>72</td>
<td>64%</td>
</tr>
<tr>
<td>Effective risk management and control system</td>
<td>40</td>
<td>36%</td>
</tr>
<tr>
<td>Appropriate preference of the balance of risk and reward</td>
<td>45</td>
<td>40%</td>
</tr>
<tr>
<td>To establish and maintain reputation of the company</td>
<td>29</td>
<td>26%</td>
</tr>
<tr>
<td>Profit incentive</td>
<td>61</td>
<td>54%</td>
</tr>
<tr>
<td>To improve the company’s capacity</td>
<td>43</td>
<td>38%</td>
</tr>
<tr>
<td>To develop and enhance the company’s core values</td>
<td>52</td>
<td>46%</td>
</tr>
</tbody>
</table>
### Table 7.11. Results of Q8

The lower bound of acceptance = 51 - 16 = 35. The following two answers are put aside.

<table>
<thead>
<tr>
<th>Answers below the lower bound</th>
<th>Frequency</th>
<th>Percentage (N=112)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To establish and maintain reputation of the company</td>
<td>29</td>
<td>26%</td>
</tr>
<tr>
<td>Low product value encourages innovation</td>
<td>27</td>
<td>24%</td>
</tr>
</tbody>
</table>

### Table 7.12. Answers below the Lower Bound of Acceptation: Q8

Reputation can be established while the company is developing its core values and improving its capacity. Therefore, establishing and maintaining reputation can be seen as included in the concept of developing and enhancing core values and improving capacity. Therefore, the answer is removed as an individual incentive from the list but will be discussed as a part of the other concepts in the next chapter.

Compared to the high product value incentive (48%), the percentage of frequency of low product value is only 24%. Considering that the percentage of frequency of the product value incentive in the semi-structured interviews is relatively low (25%), the low product value is excluded from the list of incentives.
Table 7.13. Results of Q9

The lower bound of acceptance = 56-11 = 45. The following one answer is put aside.

Table 7.14. Answers below the Lower Bound of Acceptation: Q9

Spending more with no guarantee of more profits for all the players can be seen as the result of the confusion of innovation. Innovation is not the free pass to the success of business, and with no thorough plan and clear goal, innovation can be simply a slogan rather than a strategy (Dawid et al., 2010). Therefore, it would be more appropriate to merge the answer with the concept of innovation for the sake of innovation, so the merged new concept is: Innovate for the sake of innovation and could result in a lose/lose situation.

Q10: Barriers to innovation

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage (N=119)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of innovation</td>
<td>67</td>
<td>56%</td>
</tr>
<tr>
<td>Being conservative and risk averse</td>
<td>72</td>
<td>61%</td>
</tr>
<tr>
<td>Costs</td>
<td>67</td>
<td>56%</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>88</td>
<td>74%</td>
</tr>
<tr>
<td>Resistance to change</td>
<td>58</td>
<td>49%</td>
</tr>
<tr>
<td>Strategic choice of the company</td>
<td>47</td>
<td>39%</td>
</tr>
<tr>
<td>Ineffective legal/patent protection</td>
<td>53</td>
<td>45%</td>
</tr>
<tr>
<td>Limitation of the company’s capacity</td>
<td>63</td>
<td>53%</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td></td>
<td><strong>64</strong></td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td></td>
<td><strong>11.7467</strong></td>
</tr>
</tbody>
</table>

**Table 7.15. Results of Q10**

The lower bound of acceptance = 64-12 = 52. The following one answer is put aside.

<table>
<thead>
<tr>
<th>Answers below the lower bound</th>
<th>Frequency</th>
<th>Percentage (N=119)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic choice of the company</td>
<td>47</td>
<td>39%</td>
</tr>
</tbody>
</table>

**Table 7.16. Answers below the Lower Bound of Acceptance: Q10**

Strategic choice of the company can be seen as the broader concept of the other answers, as companies may choose not to innovate due to the risks and costs involved, the specific circumstance concerned, or limitation of their capacity. The answer on its own may be too broad to be an incentive. Therefore, it is removed from the list of incentives, but will be discussed in the next chapter as a broad concept including other specific incentives.

<table>
<thead>
<tr>
<th>Q12: Cooperation in innovation</th>
<th>Frequency</th>
<th>Percentage (N = 108)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To gain new market access</td>
<td>81</td>
<td>75%</td>
</tr>
<tr>
<td>To gain access to resources and expertise of others</td>
<td>76</td>
<td>70%</td>
</tr>
</tbody>
</table>
To reduce the risks and costs involved in innovation | 83 | 77%
To achieve a win/win situation with the co-operators | 74 | 69%
To adapt to changes in the industry | 52 | 48%
To crystallise ideas in the company | 40 | 37%

Mean | 67
Standard Deviation | 15.9861

Table 7.17. Results of Q12

The lower bound of acceptance = 67-16 = 51. The following two answers are put aside.

<table>
<thead>
<tr>
<th>Answers below the lower bound</th>
<th>Frequency</th>
<th>Percentage (N=108)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To adapt to changes in the industry</td>
<td>52</td>
<td>48%</td>
</tr>
<tr>
<td>To crystallise ideas in the company</td>
<td>40</td>
<td>37%</td>
</tr>
</tbody>
</table>

Table 7.18. Answers below the Lower Bound of Acceptance: Q12

Both adapting changes and crystallising ideas can be seen as benefits that come from gaining access to the resources and expertise of others. The increasing instability of the competitive environment, with shorter product and technological life cycles, has forced companies to search beyond their own boundaries for valuable knowledge and skills in order to complement their capabilities so that they can respond to market change quickly and effectively (Becker & Dietz, 2004). During cooperation activities, knowledge exchange and learning processes could take place through which the company can gain access to the resources and skills of others, which can contribute to idea crystallisation, and then combine complementary assets to build synergies (Dachs et al., 2008).
Therefore, the two answers are removed from the list as individual incentives but will be merged with the concept of gaining access to resources and expertise and will be discussed in the next chapter.

## 7.6 Results and Summary of Questionnaire

Through the questionnaires, the findings from the previous research are validated and generalised. The results from the single-choice questions are verified, and the results from the multiple-choice questions are refined. The conclusions are summarised as following:

<table>
<thead>
<tr>
<th>Themes</th>
<th>Number of Factors before Questionnaires</th>
<th>Number of Factors after Questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signals to the need for innovation</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Incentives from interacting with competitors</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Incentives from interacting with customers</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Incentives from interacting with internal environment</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Innovation dilemma</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Barriers to innovation</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Cooperation in innovation</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

*Table 7.19. Summarisation of Results of the Questionnaire*
Chapter 8: Discussion

Brief

The aim of the chapter is to discuss the main issues arising from the research process and conclude with findings generated from the previous chapters. Therefore the measurable objectives are:

- To provide an overview of the relationship between the findings from the three studies in section 8.2.
- To discuss and review the findings regarding the incentives for innovation in part one.
- To evaluate and discuss the findings regarding game changing in part two.
- To identify and discuss the findings regarding the potential problems of the topic in part three.
- To discuss and explain the findings regarding cooperation in innovation in part four.
- To present and illustrate the framework proposed by the study in section 8.4.

Issues regarding the research questions are discussed in depth in this chapter. The findings from the previous chapters are concluded and summarised in this chapter, and a conceptual framework is established as a result.
8.1 Introduction

In the previous chapters, three interrelated studies were conducted: case study, semi-structured interviews, and Internet-mediated questionnaire survey. Through the progression of the three studies, a further understanding of the research problem has been acquired, the proposed research questions have been explained, and the research propositions have been explored.

This chapter discusses the main issues arising from the research process. Firstly, the development of findings from the three studies is discussed. Secondly, the key findings and their implications are discussed. Thirdly, the original research proposition is revised in accordance with the findings. Finally, a conceptual framework is proposed on the basis of the findings from this study.

8.2 Relationship of Findings from the Three Studies

The research is conducted inductively, as the generation of the conceptual framework emerging from the data. The inductive process goes through the following three stages.

In the case study, the initial questions investigated are:

1. How could the incentives for innovation arise?
2. How can innovation be used to change the game of business?
3. Why use innovation to change the game of business?

Based on the analysis of case studies, the direction of the research evolved and changed. The findings suggest there are phenomena that can be seen as signals for companies, as there is a need to innovate. The interactions
between the company and various factors could be the situations where the incentives for innovation arise. Moreover, the findings suggest that the incentives for innovation could also arise from the need to change the current game. Innovation, as a strategic choice of the company, can change the current game of business by altering at least one element of the PARTS value net, and may offer the company advantages. The findings emphasise the strategic functions of innovation, as it is able to provide a competitive advantage to the company over its rivals. Due to the lack of literature development in the area as mentioned in the previous chapters, research on the selected cases provides an insight into the direction of the whole study and enables the researcher to generate the initial concept map. The concept map forms the basis structure of the study from which the following research procedure is able to test, investigate, and explore.

The semi-structured interviews are extensions of the case studies. The semi-structured interviews were designed to investigate the incentives for innovation in more specific detail by following the concept map formed on the basis of the case studies. The incentives identified through interviews are categorised into two perspectives: interaction with various factors and the need to change the current game. The interviews identified the situation of innovation dilemma, the phenomenon that is also suggested by Loewe and Chen (2007). Barriers to innovation are identified and the significance of cooperation in innovation is further explored. Based on the findings of the interviews, the initial concept map is revised and refined, forming the preliminary conceptual framework this research intends to build. However, the results need validation in order to prove valuable and credible.
In the questionnaire survey, questions were designed on the basis of the findings from the interviews. Statistical tests generalise the results from the previous research to a larger population and allow further refining of the conceptual framework.

The relationship between findings from the three studies can be summarised as follows:

![Diagram of relationship between findings of the three studies]

**Figure 8.1. The Relationship between Findings of the Three Studies**
8.3 Discussion of Findings

Part One: Signals to Innovate

8.3.1 Signal for the need to innovate

Every company will face the need to change to cope with a dynamic and changing environment (Daft, 2010). The development and changes of the external environment are beyond the control of any single company (Beckman et al., 2004). In order to stay in the market, once a company has perceived a change in the external environment, it should respond rapidly and effectively. There are certain phenomena that can be seen as signals for the companies to innovate. The development of the innovative potential matches the path of development of the company and its structural units, and can also be perceived as a response to changes in the external environment and it hence has a strategic nature (Rolik, 2013).

Based on the findings of this research, the signals for the need to innovate come from the external environment and are summarised in the following table (Table 8.1).
Changes in the current market are a signal to innovate (1 in Table 8.1). As suggested by Kim and Mauborgne (2005), there are neither perpetually excellent industries nor perpetually excellent companies. The market is in a dynamic situation, and the trend will change under the influence of various factors. It is important for the company to perceive the signals to innovate in the market in order to obtain the first mover advantage and not fall behind the competition. For instance, during the interview, 92% of interviewees suggested that due to recession, their companies have to change and innovate in order to meet the changing demand in the market (Table 6.2). This is because innovation, as concluded by Cooper (2001), is about changing and adapting to the environment. The ability to adapt to the change in the market is essential in terms of the survival of a company. As suggested by Fackler (2006), the race for survival in the world of business is not to be the strongest, but to be the most adaptive.
The changes in policies and regulations (7 in Table 8.1), such as government incentive policy, are also a signal to innovate (Daft, 2010). To make the best use of the change of policy and regulation, the company needs to be able to react quickly and effectively. Moreover, when there is uncertainty in the market, it can also be a signal (2 in Table 8.1), as the flexibility and creativity of innovation can offer solutions for different problems and methods to make the most of different opportunities. Companies need to innovate to be dynamic so they can be prepared for the unpredictable future. When there is a gap in the chain of supply and demand and an unmet demand emerges (3 in Table 8.1), companies perceiving it first who are prepared to make changes are more likely to fill the gap quickly and effectively (Daft, 2010).

However, as the competition catches up, supply would exceed demand, trade barriers would arise; price wars would start, and this would finally lead to shrinking profit margin (Kim & Mauborgne, 2005). These are the signals indicating that the current market is saturated and the limit has been reached, and they are also a signal to companies for the need to innovate (4 in Table 8.1). This is the time when innovation is needed to either expand the boundaries of the current market or search actively for new opportunities in other potential areas (Abraham, 2006).

Innovation is risky because on the one hand, it involves changes and uncertainty (von Hippel, 1988). People are sometimes risk averse and tend to resist changes (Daft, 2010). Therefore, attitude towards risk and change in the industry also influences the attitude of the company towards innovation (Cooper, 2001). Supportive and accepting attitude in the industry can be seen
as a signal for the company to engage in innovation (5 in Table 8.1). 56 out of 116 respondents during the questionnaires supported this view.

On the other hand, the cost of innovation can be high and the process can be difficult, therefore, the company would want the result of innovation to be exclusive and protected (Jaffe & Lerner, 2007). As explained by Reinganum (1989), there always remains an incentive for innovation when rewards are fully appropriable, even when the number of companies is large. Effective patent regulation (6 in Table 8.1) could provide a way for the company to maximise the rewards from innovation, and can be seen as a signal for the company to engage in innovation activities (Arora & Ceccagnoli, 2006).

It is important for the company to perceive those signals to innovate as early as possible so that they can respond rapidly and effectively. Once they have acknowledged the need to innovate, the incentives for innovation can arise from the interaction between them and various factors, as well as from the need to change the current game.

Part Two: Incentives for Innovation from Interactions

8.3.2 Incentives Arising from Interacting with Competitors

As suggested by Peterson and Berger (1975), the higher the competition, the higher the innovation. Competition, as an incentive, acts in many different ways in terms of driving a company to engage in innovation (Table 8.2).
<table>
<thead>
<tr>
<th>Incentives that could arise from interacting with competitors</th>
<th>From interview</th>
<th>From questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To develop competitive advantages</td>
<td>92%</td>
<td>78%</td>
</tr>
<tr>
<td>2. To be the first mover in the market and gain temporary monopoly power</td>
<td>67%</td>
<td>78%</td>
</tr>
<tr>
<td>3. To stand out from others and be different</td>
<td>58%</td>
<td>77%</td>
</tr>
<tr>
<td>4. To compete with others</td>
<td>92%</td>
<td>63%</td>
</tr>
<tr>
<td>5. To gain more market share and maintain the company’s market position</td>
<td>58%</td>
<td>59%</td>
</tr>
<tr>
<td>6. To switch market focus and targeted market</td>
<td>33%</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Table 8.2. Incentives Arising from Interacting with Competitors**

Being aware of the existence of competitors influences the company’s strategies. First, to compete with others, the company needs to develop its competitive advantages so that it can grow and survive in the market (1 in Table 8.2). Competitive advantages as proposed by Porter (1985) can be pursued by three generic strategies: cost leadership, differentiation, and focus. Innovations can change the basis for competitive advantage (Loewe & Chen, 2007). As suggested by Schumpeter (1962) there are broadly five types of innovation: new product, new methods of production, new sources of supply, exploitation of new market, and new ways to organise a business. In this sense, cost leadership could be achieved by production and supply innovation; differentiation could be achieved by product innovation, and focus could be achieved by market and business model innovation. On the other hand, companies that face highly competitive markets must engage in strategies to gain extra market share in order to survive, especially if the market is fragmental (5 in Table 8.2). A fragmental market leads to tough competition and the company needs to fight constantly for market share.
Pressure from competitors forces the company to take the risk of innovation so that it can maintain its market position and gain market share, especially for companies with less market power (4 in Table 8.2).

Secondly, when facing competition, companies do not always need to compete with each other directly. As proposed by Kim and Mauborgne (2005), the success of a business could come from rendering the competition irrelevant. Instead of focusing on beating the competitors, the company should focus on standing out and creating its own value in the market, which leaves the competition behind. Innovation could offer a way for the company to stand out and be different, therefore creating its identity and attracting customers (3 in Table 8.2). If a company can differentiate itself enough, it will be able to compete in a protected niche with little competition, allowing a relatively high price to be charged (Kleindl, 1999). Through switching focus and changing the targeted market, the company can move away from the current market segment to a relatively open market place with fewer competitors and more opportunities (6 in Table 8.2). The ideal strategic fit for the company should be the strategy that makes the best use of the company’s advantages while avoiding taking the company into a market place with dominating competitors (Robert, 2007).

Moreover, successful innovation can ensure the company is the first mover and grant temporary monopolistic gains as rewards (2 in Table 8.2). Grossman and Helpman (1991) and Romer (1990) argue that companies undertake innovation because they seek profitable opportunities that arise from monopoly power. Lado et al. (1997) suggest that the monopolistic gains do not need to come from being a sole source; they could be obtained by a
monopolistically competitive position gained through differentiation. Therefore, the more the company can differentiate itself in the customer’s mind, the closer it is to having a monopolistically competitive position. In this sense, the company creates a monopoly space that suits itself. A monopoly space can be opened up when there are emerging needs as well (Lele, 2007).

To get there quickly and efficiently, the company should tailor itself for new capacity in order to meet the needs. However, the monopoly is not permanent (Lele, 2007). The old monopoly would end and new monopoly opportunities would arise. Continually innovating is essential for the success of a company (Daft, 2010). To maintain its market position and stay ahead, the company needs to innovate continually and keep moving forward, especially if the competitors are catching up.

8.3.3 Incentives Arising from Interacting with Customers

In a competitive marketplace, the role of customers has become increasingly important and is seen as a key element of business strategy (Gitman & McDaniel, 2005). The incentives that could arise from interaction with customers are shown in the Table 8.3.
<table>
<thead>
<tr>
<th>Incentives that could arise from interacting with customers</th>
<th>From interviews</th>
<th>Form questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To meet customers’ expectations</td>
<td>58%</td>
<td>83%</td>
</tr>
<tr>
<td>2. To attract more potential customers</td>
<td>58%</td>
<td>69%</td>
</tr>
<tr>
<td>3. To establish and maintain a good customer relationship</td>
<td>58%</td>
<td>63%</td>
</tr>
<tr>
<td>4. Stable customer base could give rise to the confidence to innovate</td>
<td>42%</td>
<td>57%</td>
</tr>
</tbody>
</table>

**Table 8.3. Incentives Arising from Interacting with Customers**

To meet customer expectations is an incentive for innovation (1 in Table 8.3), as it is a key ingredient in the success of a company (Goodman, 2009). It is the company’s job to provide products or services to meet these expectations. However, there are various expectations among customers and it is unlikely that all of them will be met. This is where innovation comes in. As suggested by Godin (2006), close interaction with customers, especially in fast-moving consumer goods industries, is the initiator of innovation activities. It is in line with the market-based view of innovation: the market pull model as proposed by Trott (2008), where the emphasis is on the role of the market and the customers.

On the other hand, the company could also raise customer expectations by introducing innovation through which new demands are created. In this situation, the company follows the resource-based view of innovation: the technology push model (Trott, 2008). Innovation can also offer the company a chance to expand its customer base by attracting new customers (2 in Table 8.3), even creating a new market (Berry et al. 2006). According to Goodman (2009), innovation is an effective way to create customer loyalty through
which a good customer relationship can be established. Being able to form and maintain a good customer relationship is essential to the success of a company (3 in Table 8.3), as it not only creates a stable customer base but can also give the company confidence to engage in innovation. Innovation is risky and sometimes the company is unwilling to take the risk (Cooper, 2001). With a stable customer base, the risk of innovation is more affordable as the loyal customers are more likely to stay with the company (4 in Table 8.3).

### 8.3.4 Incentives Arising from Interacting with Internal Environment

As argued by Wernerfelt (1995), Prahalad and Hamel (1990) and Grant (1996), innovation is the result of the valuable resources, capabilities, and skills of a company. The incentives that could arise from the interaction between the company and its internal environment are shown in the following Table 8.4.
<table>
<thead>
<tr>
<th>Incentives that could arise from interacting with internal environment</th>
<th>From interviews</th>
<th>From questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Open culture and encouraging attitude within the company</td>
<td>25%</td>
<td>79%</td>
</tr>
<tr>
<td>2. Long term strategy focus: benefit in the long term</td>
<td>25%</td>
<td>64%</td>
</tr>
<tr>
<td>3. Strategic choice of the company</td>
<td>67%</td>
<td>57%</td>
</tr>
<tr>
<td>4. Profit incentive</td>
<td>75%</td>
<td>54%</td>
</tr>
<tr>
<td>5. Big company with more resources</td>
<td>21%</td>
<td>51%</td>
</tr>
<tr>
<td>6. High product value forces innovation</td>
<td>25%</td>
<td>48%</td>
</tr>
<tr>
<td>7. To develop and enhance the company’s core values</td>
<td>50%</td>
<td>46%</td>
</tr>
<tr>
<td>8. Appropriate preference of the balance of risk and reward</td>
<td>58%</td>
<td>40%</td>
</tr>
<tr>
<td>9. Small company with more flexibility</td>
<td>21%</td>
<td>38%</td>
</tr>
<tr>
<td>10. To improve the company’s capacity</td>
<td>25%</td>
<td>38%</td>
</tr>
<tr>
<td>11. Short term strategy focus: to be flexible</td>
<td>25%</td>
<td>37%</td>
</tr>
<tr>
<td>12. Effective risk management and control system</td>
<td>75%</td>
<td>36%</td>
</tr>
</tbody>
</table>

Table 8.4. Incentives Arising from Interacting with Internal Environment

Many people are not willing to change unless they perceive a problem or a crisis (Daft, 2010). However, a company may be in danger when the external environment changes while it fails to respond. Successful innovation needs support from the top management as well as understanding from the employees (Kanter, 2005). An open culture within the company can be an incentive for innovation (1 in Table 8.4), as ideas are more likely to be accepted or at least considered and therefore employees are more willing to bring them up and less resistant to change (Daft, 2010).
Innovation is a matter of strategic choice (3 in Table 8.4), and it depends on the strategic focus of the company (Filippini & Martini, 2010). Innovation, as a short-term focus strategy (11 in Table 8.4), can be implemented to achieve immediate sales and reduce costs and risks (Strategic Direction, 2009). Moreover, according to Strategic Direction (2009), 64 percent of 2700 executives consider innovation a top-three strategic priority; and one critical to their company’s long-term competitiveness (2 in Table 8.4). A sustainable competitive advantage can be achieved through innovation by developing capacities that are valuable, rare and hard to copy (Grant, 1996). To improve the capacities and develop the core values of the company can be an incentive for innovation (7 and 10 in Table 8.4), as an important function of innovation is that it can provide the company with competitive advantages based on asymmetry, when compared with existing or potential rivals (Pitt & Clarke, 1999).

For large corporations with resources and market power (5 in Table 8.4), innovation is more affordable and therefore aggressive innovation investment can be made in order to keep ahead and lead the competition (Strategic Direction, 2009). On the other hand, SMEs can undertake innovation in an attempt to gain extraordinary profits (9 in Table 8.4) by positioning themselves in a competitive arena where there is little or no competition which is, in essence, a temporary monopoly space (Kleidl, 1999). Investment in innovation has been recognised for its potential of offering the company acquisition of its core values, as innovation could provide a strategic advantage and differentiate the company through which a reputation that identifies the company could be established (Hall, 1994). A temporary
monopoly, either tangible (profit) or intangible (reputation) can be achieved through innovation (Lele, 2005). As concluded by Sikdar and Vel (2010), innovations are key drivers of a company’s growth and profitability (4 in Table 8.4).

Cooper (2001) argues that innovation is the riskiest, yet the most important part of modern business. The risk is foreseeable, therefore, in spite of all the uncertainties, innovation becomes a manageable process when the company is able to recognise that different sets of rules, capabilities, and practices apply in different contexts (Miller et al., 2008). The horizontal linkage model proposed by Daft (2010) emphasises the importance of communication and coordination between departments in terms of achieving successful innovation. Freeman (1982) suggests that by keeping a well-balanced innovation portfolio, ‘safe’ and ‘high risk’ projects can be blended together so that the overall risks are more manageable and long-term and radical advances are not ignored. Miller et al. (2008) believe that by prototyping the market, potential can be tested with relatively lower risk as the incomplete prototypes consume fewer resources. With manageable risk, companies are more likely to implement innovation (12 in Table 8.4).

Nevertheless, when deciding on innovation, risk rationalisation is still one of the key factors that needs to be considered. As suggested by Nagji and Tuff (2012), a board of risk and reward is needed when a company initiates innovation (8 in Table 8.4). Ideally, the company would want to gain the highest overall return with the lowest risk, which is unlikely to be achieved in the real world. The uncertainty map (Figure 2.1) developed by Pearson (1991) shows the degree of risk that would come with different innovation.
Trott (2008) further suggests that, albeit with some exceptions, the largest rewards of innovation would usually accompany the highest level of risk. Therefore, the company has to decide the level of risk that it is willing to accept in terms of innovation. During the questionnaires, 54 out of 112 respondents agreed that companies working with higher value products are more likely to innovate in order to maximise the returns (6 in Table 8.4).

Part Three: Incentives for Innovation Arising from the Need to Change the Game

8.3.5 Incentives for innovation arising from the need to change the current game of business

Brandenburger and Nalebuff (1996) suggested that the biggest opportunities and the biggest profits do not come from playing the game well or differently, but from changing the game. The advantages and benefits that can be brought to companies from changing the current game can be incentives that encourage them to engage in innovation. Game theory can be separated into five elements, the Players, Added values, Rules, Tactics and Scope (PARTS) to illustrate how to use game theory as a framework to analyse a strategic situation a company may face (Brandenburger & Nalebuff, 1996). Through using PARTS as the comprehensive theory-based set of levers, it can help companies generating strategies to compete with their rivals. The incentives for innovation can arise from the need to change the current game. Findings
from the interviews regarding incentives from game changing are summarised in the following table.

<table>
<thead>
<tr>
<th>Incentives from changing the game of business</th>
<th>Element(s) changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>To make the current competition irrelevant</td>
<td>Player</td>
</tr>
<tr>
<td>1. Create new demand and open new market</td>
<td>Added value</td>
</tr>
<tr>
<td>2. Expand the boundaries of the current market</td>
<td>Rule</td>
</tr>
<tr>
<td>3. Switch targeted market</td>
<td>Tactics</td>
</tr>
<tr>
<td>4. Search for gaps in the supply and demand chain</td>
<td>Scope</td>
</tr>
<tr>
<td>To transfer business model</td>
<td>Added value</td>
</tr>
<tr>
<td>5. Differentiation</td>
<td>Rule</td>
</tr>
<tr>
<td>6. New ways to create and capture value</td>
<td>Tactics</td>
</tr>
<tr>
<td>7. Neutralise competitors’ advantages</td>
<td></td>
</tr>
<tr>
<td>Opportunities to cooperate in innovation</td>
<td>Player</td>
</tr>
<tr>
<td>8. Avoid heads-on competition</td>
<td>Rule</td>
</tr>
<tr>
<td>9. Achieve win-win situations</td>
<td>Tactics</td>
</tr>
<tr>
<td>10. Access to new market</td>
<td>Scope</td>
</tr>
<tr>
<td>To realise value innovation</td>
<td>Added value</td>
</tr>
<tr>
<td>11. Improve capacity</td>
<td>Rule</td>
</tr>
<tr>
<td>12. Establish core values</td>
<td>Tactics</td>
</tr>
<tr>
<td>13. Build reputation</td>
<td></td>
</tr>
<tr>
<td>14. Continuous innovation</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.5. Incentives for innovation from the need to change the current game of business

To render the current competition irrelevant

Robert (2007) argues that if the company is not the leader in the market, then it should not play the game according to the rules, as the rules are designed by the leader who understands them better, enforces them more effectively, and has more resources to do so. Moreover, as argued by Kim and Mauborgne (2005), within the defined boundaries of the game, the profits and opportunities are limited. Companies try to outperform each other to obtain an increased share of existing demand, but as the market space becomes more crowded, prospects for profits and growth are reduced. Therefore, the incentives for innovation can arise from trying to render the current
competition irrelevant by switching the targeted market, creating new demands, filling the gap in the supply chain, or entering into a new market or region.

Through innovation, a company can create new demands and educate the market (1 in Table 8.5) so that new customers are brought in and current competitors are left behind (Yalabik et al., 2012). The scope of a game can also be changed by opening a new market segment where profitable opportunities could arise from monopoly power (Tang, 2006). This can create new demands, and first mover advantage can be obtained, thus enhancing the company’s added value as well (Yalabik et al., 2012).

A company can switch the targeted market or enter into an emerging market by innovation (3 in Table 8.5) so that the company itself leave the current game and enters a new game (Kim & Mauborgne, 2005). When the company enters into a new market or new region, the game itself is changed. In a different game, the company is evaluated differently (Kim & Mauborgne, 2005). Therefore, the added value of the company is changed. On the one hand, a company can expand the scope of the game by going into a new market where more opportunities are available (Kim & Mauborgne, 2005). On the other hand, the appearances of newcomers can also expand the scope of the game as new elements are introduced and new value is brought in the game (Casadesus-Masanell & Zhu, 2013).

By finding the gap in the supply and demand chain and filling it (4 in Table 8.5), the company can become the first mover in the sector, which could change the role of the company in the game: from a follower to a leader (Lele,
Instead of accepting the defined boundaries, expanding the scopes offers more opportunities for profits and growth (Brandenburger & Nalebuff, 1996). A company can expand the boundaries of the market by introducing new products/services (2 in Table 8.5), and therefore bring more customers in the game (Sikdar & Vel, 2010). By expanding the boundaries of the market and bringing in more customers, other players’ added values can be lowered (Sikdar & Vel, 2010). As argued by Brandenburger and Nalebuff (1996), more customers not only leads to more sales and more profits, but also lowers the added values of all the existing customers, which puts the company in a stronger bargaining position. The scope of the game can also be expanded by the company via going into new regions, as the fusion of the global market is accelerating, the boundaries of the market are no longer limited to one nation, and there are more opportunities and customers to be found and explored in a worldwide market (Daft, 2010).

**Transferring the business model**

Rules give structure to a game, and in business a rule might arise from law, custom, practicality or contract (Brandenburger & Nalebuff, 1996). However, there is no universal set of rules that limits how the game of business should be played. Therefore, in addition to using existing rules to their advantage, players may be able to revise them or come up with new ones. As suggested by Brandenburger and Nalebuff (1996), the biggest profits come from playing the right game, rather than accepting the rules that are set by others, which may not be to the company’s favour. The company should actively change the rules to its advantage while neutralising competitors’ strengths. When the rules are changed, the players who fail to react are temporarily immobilised,
which provides the opportunity for the company who has changed the rules to make significant gains (Robert, 2007).

A company can change the rules by differentiation (5 in Table 8.5). As suggested by Miller et al. (2008), each game of business entails a distinct logic of innovation, calling for specific strategies and rules, instead of complying with ‘best practice’, through adapting the strategies, capabilities and practices to the requirements of value creation and capture in the innovation game in which the company have chosen to compete, as an innovation’s value lies not only in itself, but also in what the market is willing to perceive as the value (Calantone & Montoya-Weiss, 1993). Therefore through differentiation, the company is actively educating the market and strengthening the position of innovation in customers' minds (Sikdar & Vel, 2010).

Through business model innovation, which is suggested by Casadesus-Masanell and Zhu (2013) as searching for new ways to create and capture value and focusing on finding new ways to generate revenues, a company can neutralise its competitors’ most important strengths (7 in Table 8.5) and therefore, manage to lower their added values (Robert, 2007). In such a situation, a dilemma is created for the competitors, as if they come after the company they would lower their added value in the game they are already playing with extra costs in changing their current business model (Chakravorti, 2004).
Opportunities to cooperate in innovation

Hall (1994) argued that the need to survive and succeed in the competition is the mutual goal for profit-seeking companies, which pushes the creation and diffusion of innovation. Moreover, as suggested by Brandenburger and Nalebuff (1996), in the game of business, companies can succeed without requiring others to fail. Therefore, the incentives can arise because there are opportunities for companies to cooperate in innovation.

Perceptions are a fundamental element of any game of business due to uncertainty and asymmetric information. Through tactics, the company can shape the perception of other players and thus change their behaviour (Brandenburger & Nalebuff, 1996). A company can employ tactics to avoid head-on competition (8 in Table 8.5) either by making the current competition irrelevant or by convincing the competitors that mutual goals exist and that a win-win situation is possible. Cooperating rather than competing with each other can change the rules of the game. Cooperation in innovation seems to improve the performance of companies as well as social welfare, and a win-win situation can be achieved (9 in Table 8.5) for all players (Pyka, 2002). The players of a game can also be changed by turning competitors into co-operators. The game of business is not all about winning and losing; companies can succeed without requiring others to fail (Brandenburger & Nalebuff, 1996). Therefore, cooperation in innovation is feasible and in certain situations it can result in a win-win result for all players.

As suggested by Chesbrough (2003), in modern business, companies would benefit by using external ideas and technologies in their own business, while letting their unused ideas be used by others. A company can change the
scope of the game through cooperation with others, as it not only provides opportunities for companies to communicate and exchange ideas, but also gives the company access to new market areas or segments (10 in *Table 8.5*) (Muller et al., 2012).

**Realising value innovation**

A value innovation means that instead of focusing on beating the competitors in the existing market space, the company should focus on transcending the existing market boundaries by creating a leap in value for the buyer and standing out from the competition (Kim & Mauborgne, 2005). As suggested by Brandenburger and Nalebuff (1996), added values are what players bring to the game. A company can change the added value by raising its own or lowering that of others.

To raise added value, on the one hand, a company can improve its capacity by value chain innovation (11 in *Table 8.5*), which means breaking down the competitive process into various steps and seeking to add more value at each step than the competitors do (Robert, 2007). On the other hand, a company can establish its core values (12 in *Table 8.5*) and reputation (13 in *Table 8.5*) by differentiation and making the best use of its own advantage (Trott, 2008). If the company can manage to secure the exclusivity of its values, a temporary monopoly space could be achieved and the added value of the company can be lifted (Lele, 2005).

The ability to continuously innovate (14 in *Table 8.5*) is also key to improving the company’s capacities and maintaining its advantage. A company can use tactics to shape the perception of customers by continuous innovation,
actively educating the market. As suggested by Kim and Mauborgne (2005), innovation is a dynamic iterative process. With the possessed capacities and market records, a company is able to establish its reputation, which could improve customers’ confidence and loyalty towards the company (Riezebos, 2003). Moreover, an innovation’s value lies not solely in itself, but also in what the market is willing to perceive as the value (Calantone & Montoya-Weiss, 1993). Therefore, while continuously innovating, the company is actively educating the market and strengthening the position of innovation in customers’ minds (Sikdar & Vel, 2010).

Part Four: Potential Problems

8.3.6 Innovation Dilemma

<table>
<thead>
<tr>
<th>Innovation dilemma</th>
<th>From interviews</th>
<th>From questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lose core value due to diversifying too much</td>
<td>42%</td>
<td>55%</td>
</tr>
<tr>
<td>2. Innovate for the sake of innovation which could result in a lose-lose situation</td>
<td>50%</td>
<td>54%</td>
</tr>
</tbody>
</table>

Table 8.6. Innovation Dilemmas

Innovation is one of the most important concepts for modern business. As suggested by Trott (2008, pp.13), “not to innovate is to die.” Many business magazines including Fortune (The world’s most admired companies) and BusinessWeek (The world’s 50 most innovative companies) use innovation as one of the criteria to evaluate the success of companies.

However, despite the importance of innovation being widely accepted by modern business, innovation remains a management dilemma. On the one hand, the need to innovate is universally perceived as the key to
organisational survival, but on the other hand, companies are confused about innovation (Denning, 2005). Confusion of the application of the innovation can lead to the dilemma situation, as during the interviews, nearly half of the participants expressed concerns that companies could lose their core values by diversifying too much (1 in Table 8.6) and also innovating merely for the sake of innovation (2 in Table 8.6).

As argued by Loewe and Chen (2007), companies may be trapped by these situations due to innovating without clear goals and generating ideas without new insights. With the intensity of competition, the fear of falling behind competitors could force the company to turn to innovation in order to gain a competitive edge and stay in the competition (Daft, 2010). However, with no thorough plan and clear goal, innovation may simply be a slogan rather than a strategy (Dawid et al., 2010). Innovation is not a free pass to business success; to innovate successfully the company needs to adapt its strategies, capabilities and resources to the requirements of the innovation game in which it has chosen to compete (Miller et al., 2008).

Moreover, confusion of the meaning of innovation can also lead to the dilemma situation, as assuming that innovation is all about making a few “big breakthroughs” and always requires heavy investments, companies may find themselves in the “innovation war”, which is similar to the “price war” as it leads to the same result: a lose-lose situation (Loewe & Chen, 2007). Technology innovation is an important type of innovation, but it is not the only type. Organisational innovation, management innovation, marketing innovation and other types of innovation are just as important as technology innovation (Rothwell, 1992). Companies should choose the type of innovation
that serves their needs best rather than competing blindly for one type of innovation only.

Furthermore, it is common to associate innovation with physical change, but in fact many changes introduced involve very little physical change. Instead, it is the activities performed that change (Trott, 2008). Therefore, heavy investment is not always necessary, and changing the way of thinking is emphasised more in value innovation and business model innovation (Kim & Mauborgne, 2005; Casadesus-Masanell & Zhu, 2013).

8.3.7 Barriers to Innovation

Despite the advocacy of the importance of innovation by modern business, innovation is still a difficult task and is usually accompanied by high odds of failure (Trott, 2008). The possible barriers to innovation suggested by this research are shown in the following table.

<table>
<thead>
<tr>
<th>Barriers to innovation</th>
<th>From interviews</th>
<th>From questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Uncertainty</td>
<td>33%</td>
<td>74%</td>
</tr>
<tr>
<td>2. Being conservative and risk averse</td>
<td>50%</td>
<td>61%</td>
</tr>
<tr>
<td>3. Costs</td>
<td>42%</td>
<td>56%</td>
</tr>
<tr>
<td>4. Risk of innovation</td>
<td>75%</td>
<td>56%</td>
</tr>
<tr>
<td>5. Limitation of capacity</td>
<td>42%</td>
<td>53%</td>
</tr>
<tr>
<td>6. Resistance to change</td>
<td>33%</td>
<td>49%</td>
</tr>
<tr>
<td>7. Ineffective legal protection</td>
<td>25%</td>
<td>45%</td>
</tr>
</tbody>
</table>

Table 8.7. Barriers to Innovation

Uncertainty is one of the reasons behind the riskiness of innovation (1 in Table 8.7). There is no guarantee for the success of innovation. Will customers accept the new product, service or marketing approach? Will the
innovation actually work under the market condition? Innovation involves numerous factors acting separately, but often the factors influence each other. Companies have to respond to both internal and external events, some of which may even beyond their control (von Hippel 1988).

Cost is another reason that makes innovation risky (3 in Table 8.7). It is not only the cost that the company has to invest to make the innovation work, as not all the innovations require heavy investment, but also the cost that the company may have to bear in the event of failure (Trott, 2008). The cost could be tangible such as losing profits and revenues or intangible such as missing initiatives or damaging reputation (Cooper, 2001). All these factors make the risks of innovation high and can therefore discourage companies from engaging in innovation (4 in Table 8.7).

Conservative attitude towards new ideas could stop companies from being innovative (2 in Table 8.7), and as people are generally risk averse and resistant to change (6 in Table 8.7), innovation can therefore be used by companies as a last resort rather than an active strategy (Dawid et al., 2010). Unless a problem or a crisis is perceived, companies may resist change and be unwilling to innovate (Daft, 2010).

On the other hand, a company’s ability to innovate might be limited by its capacities (5 in Table 8.7). It could either be limited by insufficient resources, knowledge and experiences, or due to having no channel or access to the desired market position (Ritala & Hurmelinna-Laukkanen, 2009).

Finally, ineffective protection of the reward of innovation can reduce the incentive (7 in Table 8.7). As explained by Reinganum (1989), there always
remains an incentive for innovation when rewards are fully appropriable, even when the number of companies is large. Whereas once legal and regulation protection become imperfect, to the extent that spill over reduce the ability of an innovating company to appropriate the profits for its own, there is a disincentive to undertake innovation (Pyka, 2002).

Part Five: Cooperation in Innovation

8.3.8 Cooperation in Innovation

Investment in innovation has been recognized for the potential of offering the company to acquire a strategic advantage (Hall, 1994). However, due to the nature of innovation, there are several barriers that may stop a company from engaging in innovation as discussed above. Cooperation in innovation is proposed as a way to overcome those barriers in this research.

As explained in the Chapter 2, the differentiation of various types and forms of cooperation is not the purpose that this research wishes to investigate in detail. Therefore, cooperation in this research is regarded as a comprehensive concept, which could include partial cooperation, non-equity alliance, equity alliance, and joint venture, depending on the interests and purposes of the cooperating companies.
**Table 8.8. Cooperation in innovation**

The risks of innovation include the uncertainty of the outcome and the cost of investment and failure (Von Hippel 1988; Trott, 2008). With the intensity of competition, a company may be reluctant to take these risks all by itself.

As suggested by Beath et al. (1989) and Pyka (2002), cooperation can restore the incentive to innovate that has been reduced by the accompanying risk and cost (1 in Table 8.8), and improve the performance of companies. Zineldin (2004) also suggests that cooperation can create new value by reducing transaction costs, uncertainty and the level of financial and practical risks associated with innovation. This is in line with transaction cost theory, as it argues that strategic alliances are often designed to achieve the minimisation of the sum of production and transaction costs (García-Canal, 1996). Economies of scale can also be achieved by cooperation in innovation, as well as cost sharing and risk spreading (de Faria et al. 2010). Furthermore, as suggested by both organisation theory and business strategy theory, alliances

<table>
<thead>
<tr>
<th>Cooperation in innovation</th>
<th>From interviews</th>
<th>From questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Share risks and costs</td>
<td>58%</td>
<td>77%</td>
</tr>
<tr>
<td>II. Access to new market</td>
<td>42%</td>
<td>75%</td>
</tr>
<tr>
<td>III. Access to resources and expertise</td>
<td>67%</td>
<td>70%</td>
</tr>
<tr>
<td>IV. Achieve a win-win situation</td>
<td>58%</td>
<td>69%</td>
</tr>
</tbody>
</table>
may be a defensive mechanism for the company in order to evade strategic uncertainty (Pfeffer & Nowak, 1976; Kogut, 1988).

Cooperation is a great opportunity for the company to access information about market trends, aspirations and plans, which could provide a substantial competitive advantage (3 in Table 8.8). Transaction cost theory believes that creating new products, new organisations, new management techniques, and new technology are some of the purposes of strategic alliance (Toyne & Horaguchi, 1990). The increasing instability of the competitive environment, with shorter product and technological life cycles, has forced companies to search beyond their own boundaries for valuable knowledge and skills in order to complement their capabilities so that they can respond to market change quickly and effectively (Becker & Dietz, 2004). Broadening the product line and effectively filling gaps in the supply and demand chain are two of the competitive advantages that strategic alliances can offer, as suggested by business strategy theory, as well as acquisition of new skills, which is suggested by organisation theory (Kogut, 1988). During cooperation activities, knowledge exchange and learning processes may take place through which the company can access others’ resources and skills, and also contribute to idea crystallisation, and then combine complementary assets to build synergies (Dachs et al., 2008).

Cooperation in innovation can also open the range of strategic options that a company can choose. As suggested by de Faria et al. (2010), cooperation activities in innovation are opportunities for new market access (2 in Table 8.8). New market entry is also one of the competitive advantages that strategic alliance can offer, as suggested by both organisation theory and
business strategy theory (Kogut, 1988). Companies can expand the scope of their market base through cooperation, as the market strength can be enhanced and new opportunities can be exploited (Bönte & Keilbach, 2005).

Denning (2005) believes that the fundamental problem in innovation is not finding more new ideas, but is a matter of establishing a way of running the company that is open to the exploration of new ideas. Open innovation, as a concept presented by Chesbrough (2003), adopting a business strategy perspective, argues that the process of innovation has shifted from one closed system, internal to the firm, to a new mode of open system involving a range of players distributed up and down the supply chain. By making greater use of external ideas and resources in their own business, while letting their unused ideas be used by others, the performance of companies as well as their social welfare are improved and a win-win situation is achieved (4 in Table 8.8).

8.4 Conceptual Framework Proposed by the Study

The aim of this study is to build a conceptual framework, from a strategic management perspective, for the application of incentive for innovation in order to respond to signals that there is a need to innovate. Game theory is applied as a framework for the analysis of the interactions between companies and to identify how the incentives for innovation arise.

After the data collection procedures, the findings of the research were discussed as above. As a result, a conceptual framework is established to illustrate the outcomes of this research (Figure 8.2).
The development and changes of the external environment are beyond the control of any single company. In order to stay in the market, once a company has perceived a change in the external environment, it should respond rapidly and effectively. There are phenomena that can be seen as signals for the companies to innovate. It is important for the company to perceive those signals to innovate as early as possible so that they can react before others. Those signals can be seen as early warnings or hints that remind companies there is a need for innovation in the market (Part One: Signals to Innovate).

Once they have acknowledged the need to innovate, the incentives for innovation can arise from two perspectives: the interaction between companies and various factors and the need to change the current game.
As guided by the game theoretical perspective, the incentives for innovation are identified through interactions between the company and its competitors, its customers, and the internal environment (Part Two: Incentives for Innovation from Interactions).

As the biggest opportunities and the biggest profits come not from playing the game well or differently, but from changing the game (Brandenburger & Nalebuff, 1996), through using PARTS as the comprehensive theory-based set of levers, the advantages and benefits that can be brought to companies from changing the current game can be incentives that encourage them to engage in innovation (Part Three: Incentives for Innovation from the Need to Change the Current Game).

However without clear objectives and a thorough plan, the company could fall into the trap of innovation dilemma, therefore losing its core values through diversifying too much, or innovating for the sake of innovation, thus resulting in a lose-lose situation for all players. Due to the nature of innovation, there are barriers that could possibly stop companies from innovating including uncertainty, being conservative and risk averse, cost issues, risk of innovation, limitation of capacity, resistance to change, and ineffective legal protection. These are the potential disincentives that can stop companies from innovating (Part Four: Potential Problems). There are various ways to remove the barriers and restore the incentives. In this research, cooperation is discussed as a way for the company to overcome the barriers to innovation and restore the incentives for innovation, as cooperation in innovation can provide a way for the company to share risks and costs, gain access to new markets,
resources and expertise, and also to achieve a win-win situation for all players (Part Five: Cooperation in Innovation).
Chapter 9: Conclusions and Recommendations

Brief

This chapter reviews the overall research. The relationship between the stated aim, the measurable objectives, the research question and the works done are examined. Contributions to knowledge are explained and the limitations and possible bias of the research are presented. It is hoped to motivate the refinement of this study and to stimulate the carrying out of further works of research.
9.1 Introduction

The final chapter concludes the study by summarising the key findings, reviewing the research aim and objectives, and answering the research questions listed in Chapter 1. The limitations of the study are considered and recommendations for further research are proposed.

9.2 Summary of the Key Findings

The key findings of this research can be summarised in four parts:

| 1. Signal to Innovate | • Changes in the current market  
|                        | • Uncertainty in the market  
|                        | • Unmet needs and gaps in the supply and demand exist  
|                        | • Market saturation and market limitation appear  
|                        | • Supportive attitude in the market/industry  
|                        | • Effective patent protection exists  
|                        | • Changes in policies and regulations  

| 2. The incentives for innovation: From Interactions | • Incentives arise from interacting with competitors (6 incentives identified);  
|                                                   | • Incentives arise from interacting with customers (4 incentives identified);  
|                                                   | • Incentives arise from interacting with internal environment (12 incentives identified).  

| 3. The Incentives for Innovation: From the Need to Change the Current Game | • To make the current competition irrelevant (4 incentives identified);  
|                                                                           | • To transfer business model (3 incentives identified);  
|                                                                           | • Opportunities to cooperate in innovation exist (3 incentives identified);  
|                                                                           | • To realise value innovation (4 incentives identified) |
4. Potential problems (Disincentives for innovation)
- Innovation dilemma (2 dilemmas identified);
- Barriers to innovation (7 barriers identified).

5. Cooperation in innovation (Restore Incentives for Innovation)
- Share risks and costs;
- Access to new market;
- Access to resources and expertise;
- Achieve a win-win situation.

Table 9.1. Summary of the Key Findings

9.3 Review of Aim and Objectives

The aim of this study is to build a conceptual framework, from a strategic management perspective, for the application of incentive for innovation in order to respond to signals that there is a need to innovate. Game theory is applied as a framework for the analysis of the interactions between companies and identifying how the incentives for innovation arise.

The aim has been realised through five measurable objectives as posed in Chapter 1. The first two objectives have been achieved by the literature review in Chapter 2.

Starting from case studies in Chapter 5, the initial concept map is generated regarding the remaining three objectives, which guides the following semi-structured interviews in Chapter 6. Signals to innovate and incentives for innovation are identified and investigated in more detail. The interviews identified the situation of innovation dilemma, the phenomenon that is also suggested by Loewe and Chen (2007). Barriers to innovation are identified and the significance of cooperation in innovation is further explored. Based on
the findings of the interviews, the initial concept map is revised and refined to a preliminary conceptual framework. From questionnaires in Chapter 7, the findings are triangulated and formalised. The remaining three objectives are realised through the above procedures, and a conceptual framework is proposed as the conclusion of the study.

9.4 Answers to Research Questions

The research questions are listed and answered as follows:

- What are the signals for companies to innovate?

The development and changes of the external environment are beyond the control of any single company. In order to stay in the market, once a company has perceived a change in the external environment, it should respond rapidly and effectively. Through case studies and interviews, there are seven phenomena identified that can be seen as signals that give early warnings/hints to companies, suggesting that there is a need to innovate in the market.

- What are the incentives that could encourage a company to engage in innovation?

Under the guidance of game theoretical perspective, the findings suggest that the incentives for innovation are from two perspectives: from interactions between the company and various factors; and from the need to change the current game of business.

- How do the incentives for innovation arise?
From interactions, the incentives for innovation arise from the company interacting with competitors, customers, and the internal environment. From the need to change the current game, the incentives arise from making the current game irrelevant, transferring business model, opportunities to cooperate in innovation, and realising value innovation. In this study, the strategic function of innovation is emphasised as the main method to change the game. Employing innovation in a competitive environment allows the company to achieve a strategic advantage, therefore changing the current game of business.

- What are the potential difficulties of changing the game of business through innovation?

Innovation dilemma and barriers to innovation are identified in the study as the problems and disincentives that the company may be confronted with when trying to engage in innovation and change the game of business. Without clear objectives and a thorough plan, the company could fall into the trap of innovation dilemma, a phenomenon that is also suggested by Loewe and Chen (2007). Due to the nature of innovation, there are barriers that could possibly stop companies from innovating. The barriers mainly come from risk and cost perspectives.

In the research, cooperation in innovation is proposed as a method for the company to remove the barriers to innovation and restore the incentives for innovation. Through cooperation, the performance of companies can be improved and a win-win situation can be achieved in the industry.
9.5 Contributions to Knowledge

9.5.1 Contributions to Research

The following contributions of new knowledge were made:

- Signals that can give the company early warnings/hints to the need for innovation in the market are identified.
- Incentives that can drive a company to engage in innovation through interactions between the company and various factors are identified.
- Incentives that can drive a company to engage in innovation through the need to change the current game are identified.
- Barriers and difficulties that a company may encounter while trying to innovate are discussed.
- Cooperation in innovation is suggested as a method to remove the barriers to innovation and restore the incentives for innovation.

The findings of the research were validated by the collection of data through field studies and the essential learning was crystallised through the writing process of the thesis. By presenting the whole research journey in a descriptive narrative, critical readers can follow the underlying logic to reach the conclusions of this study.

9.5.2 Implications for Practice

This research presents the signals that can give businesses early warnings/hints to the need for innovation in the market and the incentives for innovation in modern business from game theoretical and strategic perspectives. The proposed model can aid companies in motivating
participation in innovation, achieving a strategic advantage in a competitive environment.

Moreover, the strategic function of innovation is emphasised in the research due to its potential of offering the company the chance to acquire a strategic advantage, which can change the current game and provide sustainable benefits in the long term.

Furthermore, by identifying the barriers and difficulties that companies may confront in innovation, precautionary procedures could be taken so that raise the success rate of innovation. The advantages of cooperation in innovation are discussed. Therefore, depending on the interests and purposes of the company, cooperation can be a way to overcome the difficulties in innovation.

9.6 Limitations and Bias

9.6.1 Scope

The study did not investigate the specific context of any nation or region. It would not be appropriate to attempt to apply the framework to a specific nation or region without considering its cultural context.

The samples that the study investigates in the semi-structured interviews and questionnaires are not limited to any particular industry; they are from a broader representation of industries. It would not be appropriate to apply the framework without considering the unique character of the particular industry.
9.6.2 Data and Analysis

In order to achieve the research objectives, qualitative research was the main methodology for the study. Although the flexibility of the case study and semi-structured interview study offered opportunities to explore complex topics, the lack of standardisation in such methods may have led to inaccuracy.

As the topics this research investigated were mainly subjective rather than objective, interpretation and explanation of the meaning of the data collected were often needed. It is possible that there are biases in the data interpretation.

Also, due to the time limit of this research and the availability of resources, the number of interviews and questionnaires was not as high as expected. For the purpose of verification with the framework, more data may be required. Therefore, the conceptual framework may be limited in accuracy by the lack of data.

9.6.3 Application of the Framework

The circumstances in the real world are complex and dynamic. Therefore, the framework proposed is not able to compete against human experiences. The conceptual framework is only a tool that intends to help gain a better understanding of the circumstances.

9.7 Recommendations for Further Research

The research questions posed by the study have been answered and the aim of the research has been achieved. However, some new questions have been raised, which could be potential areas for further research.
9.7.1 Further Research on the Value of Cooperation in Innovation

During this research, cooperation in innovation has been proposed as a method to remove the barriers to innovation as well as a way to change the current game of business. However, considering the research aim and questions of the study, the function and value of cooperation in innovation was not investigated and explored further.

Since the early 1980s, a branch of literature called new industrial economics analysed the conditions and incentives needed for firms to engage in R&D, which is a stage of the innovation process, especially in terms of cooperation by drawing on a game theoretic framework (Pyka, 2002). The majority of theoretical models analysed questions regarding the conditions and incentives necessary for companies to engage in cooperation in R&D and the welfare properties of the different possible solutions (Pyka, 2002). Innovation and competition are analysed on two stages: collaboration only in R&D, and collaboration in R&D as well as in the markets (Beath et al., 1989). The results indicate that either way, collaboration seems to improve the performance of companies as well as social welfare in situations where technological appropriateness is low and technological spillover reduces the incentives of companies to invest in costly and risky R&D processes (D’Aspremont & Jacquemin, 1988). Cooperation in innovation is considered as a means to restore reduced R&D incentives.

However, the studies on cooperation in innovation focus mainly on the R&D stage and are conducted from a technological perspective. This research has
suggested the strategic advantages that cooperation in innovation could offer to the company. However, due to the limitation of the research objectives, the subject has not been studied in depth. What types of cooperation should the company choose for different circumstances? What are the functions of different types of cooperation in innovation? And what is the value of different types of cooperation in innovation for the company? These are potential areas for further research.

9.7.2 Further Research on the Removal of Barriers to Innovation

Innovation is a difficult task and is usually accompanied by high odds of failure (Trott, 2008). There are barriers to innovation that may reduce the incentives for innovation for the company. In order to motivate companies to participate in innovation, these barriers need to be removed in order that incentives can be restored.

So far this study has identified barriers that could reduce incentives to innovate for companies, which including uncertainty, cost, conservative attitude, limitation of capacity, and ineffective protection. There is more than one way to overcome the barriers, depending on the circumstances. Due to the limitation of the research scope, only cooperation in innovation has been proposed in the research as a method to overcome barriers to innovation. How are different types of barriers overcome? Which method should be used in these particular circumstances? These are potential areas for further research.
9.7.3 Further Research on Building a Predictive Model for the Application of the Incentives for Innovation

A predictive model can be built, based on the conceptual framework proposed by this study, giving early warning of the need to innovate and predicting the possible behaviour the company might engage in when responding to different incentives for innovation.

Due to the inductive nature of the research process of this study, qualitative data is collected to establish the conceptual framework. The signals for the need to innovate and the arising of incentives for innovation are identified in the conceptual framework. To form a valid predictive model, a large amount of quantitative data is required regarding the predictors so that trends and patterns can be observed and reliable predictions can be made. There is not sufficient data to build a predictive model from the data collected from this research. Nevertheless, this research provides the foundation to build a predictive model.

The predictive model is a statistical model of future behaviour. It is made up of a number of predictors, which are variable factors that may influence results or future behaviour (López, 2013). In predictive modelling, data is collected for the relevant predictors. The data can be both explicit and implicit and can be collected from field observation, in-depth interview, and questionnaire, depending on the feature of the data.

The predictors can be drawn from the conceptual framework formed in this study. The first predictor consists of the seven signals for the need to innovate. Incentives for innovation that arise from different perspectives is the
second predictor. Innovation dilemma and barriers to innovation as the disincentives for innovation is the third predictor. The fourth predictor is cooperation in innovation as a factor that can restore the incentive for innovation.

Predictive analytics is employed for data mining concerned with forecasting probabilities and trends. Data mining is an analytic process designed to explore data in search of consistent patterns or systematic relationships between variables (Edelstein, 1999). The process of data mining consists of three stages:

I. *Exploration*: This stage usually starts with data preparation which may involve data cleaning, data transformations, and selecting subsets of records. Data regarding the predictors as mentioned above could be gathered through employing exploratory data analysis using a wide variety of graphical and statistical methods in order to identify the most relevant variables and determine the complexity and general nature of the model that can be investigated in the next stage.

II. Model building and pattern identification with validation: In this stage, various models are considered. The best one is chosen based on its predictive performance, especially in terms of explaining the variability in question and producing stable results across samples. Competitive evaluation of models could be employed, by applying different models to the same data set and then comparing their performance to enable the best one to be chosen.
III. Development: This stage involves the application of the model selected as the best in the previous stage and applying it to new data in order to generate estimates of the expected outcomes and predictions.

Through predictive analytics, a statistical model is formulated, predictions are made and the model is revised as additional data becomes available (Kuhn & Johnson, 2013).

The value of a predictive model for the application of incentives for innovation to practitioners comes mainly from offering opportunities to respond to the need for innovation ahead of others and selecting behaviour that is suitable for the incentives for innovation. It can support the company with making the right strategic choice and making the best use of the opportunity.
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Appendices:

Appendix 1: Literature Map

- Application of game theory to incentives for innovation in modern business
  - Need to study 1: Incentives for changing the game.
    - Behavioral game theory
      - Camerer 2003
    - Industrial organization
      - Freeman, 1982
      - Howe, 1978
    - Strategic alliances
      - Vyas et al. 1995
      - Kogut, 1988
    - Coopetition
      - Brandenburger & Nalebuff, 1996
      - Dixit & Nalebuff, 2007
    - Changing the game
      - Brandenburger & Nalebuff, 1996
      - Schelling, 1981
    - Blue oceans
      - Kim & Mauborgne, 2005
  - Incentives for innovation
    - Need to study 2: How to change the game through innovation.
      - Temporary monopoly
        - Lele, 2007
      - Profit maximization
        - Porter, 1985
        - Hall, 1994
      - Innovation networking
        - Pyka, 2002
        - Chesbrough, 2003
      - Resource based view
        - Wernerfelt, 1995
        - Barney, 1991
  - Innovation management
    - Innovation and competitive advantage
      - Trott, 2008
      - Lengnick-Hall, 1992
    - The theory of the firm
      - Freeman, 1982
      - Hall, 1994
      - Lynch, 2009
Appendix 2: Prisoners’ Dilemma

The Prisoners’ Dilemma

The Prisoners’ Dilemma is the most famous and analysed game in game theory. It presents the genuine paradox and demonstrates that two suspects each have an incentive to confess that ultimately leads to a result that is bad for both when both of them similarly do what their personal interests dictate.

<table>
<thead>
<tr>
<th>Prisoner 2</th>
<th>Cooperate</th>
<th>Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperate</td>
<td>(1, 1)</td>
<td>(5, 0)</td>
</tr>
<tr>
<td>Defect</td>
<td>(0, 5)</td>
<td>(3, 3)</td>
</tr>
</tbody>
</table>

The police arrest two suspects. The police, having separated the prisoners, visit each of them to offer the same deal. If both of them remain silent, both prisoners are sentenced to only one year, but if one remains silent (cooperate) and the other testifies for the prosecution against the other (defect) then the defector goes free and the silent accomplice receives a five-year sentence. If each betrays the other, each receives a three-year sentence.

Cooperating is strictly dominated by defecting, so that the only possible equilibrium for the game is for all players to defect. No matter what the other player does, one will always gain a better outcome by playing defect; in spite of the overall better outcome if both of them play cooperate.
Appendix 3: Decision-Making Process

The Strategic Decision-making Process

There are three types of process flow, each of which contributes to the final outcome of the total process.

**Primary flow:** encompasses the main functions of the strategic decision-making process.

**Corollary flow:** constitutes the ancillary function of the process. In combination with the primary flow, the corollary flow enhances the prospects for a successful strategic decision.

**Information flow:** constitutes the exploration of possibilities in the search for alternatives or feedback of information from the external environment, signifying the acceptance or non-acceptance of the implemented strategic decision.
Appendix 4: Individual Case Studies

*Case I: The seventh-generation video game console competition: Nintendo vs. Sony vs. Microsoft*

The first generation of video game consoles began in 1972 with the release of Magnavox Odyssey (Wolf, 2008). However, as an emerging industry, video games did not capture much public attention at the beginning. In contrast, the newborn industry twice suffered business crashes in 1977 and 1983 (Wolf, 2008). Nintendo entered the video game console market in 1985, which was during the third generation of video game consoles (1983-1995), just after the second video game business crash, with its Nintendo Entertainment System (NES) bundled with Super Mario Bros (Wolf, 2008). The NES instantly achieved huge success (Ziesak, 2009). Sony entered the industry in the fifth generation (1993-2001). It launched its first game console (PlayStation) in 1994. PlayStation outsold all of its competitors very quickly, except the aging Super NES, which Nintendo launched in 1991 during the fourth generation (1989-1999) (Kent, 2001). The reason that the Super NES was able to hold its position was because it still had the support of many major game publishers at that time (Kent, 2001). It was at this point that the competition between Sony and Nintendo began. Due to the problem of the aging Super NES, Nintendo released a new console called the Virtual Boy in 1995, which soon became a failure and was taken off the market in 1996. In 1996, Nintendo launched Nintendo64 along with Super Mario64 (Ziesak, 2009). Although the Nintendo64 achieved success in the US and Europe, it never outsold PlayStation in Japan (Kent, 2001). By the end of the fifth generation, Sony was winning the competition and became the industry leader (Wolf, 2008).
The situation did not change for Nintendo in the sixth generation (1998-2004), during which Sega exited the industry and Microsoft entered with Xbox (Wolf, 2008). Sony, with its new console PlayStation2, which was released in 2001 and soon became the best selling console at the time, was still the market leader of the industry (Wolf, 2008). Nintendo tried to compete with PlayStation2 and followed a year later with the Nintendo GameCube, which was more or less with the same as PlayStation2’s system in terms of technical specifications (Ziesak, 2009). However, it never surpassed its competitor as it was lacking mature market-desired games and was hindered by its reputation as being a ‘kid’s console’ (Ziesak, 2009). In the sixth generation, therefore, the industry continued the trend established by the PlayStation, towards increasingly sophisticated, complicated, and adult-oriented game play (Wolf, 2008).

Since Sony entered the industry, Nintendo was never winning the competition and also lost its market leader position that it acquired after the release of Super NES (Kent, 2001). After almost ten years’ competition, Nintendo knew that in terms of capital and technology they could not compete with Sony. With no advanced technology in hand, no large amount of funds available, to stay in the market, Nintendo had to think of another way to compete with its rivals.

Unlike in the video game console industry, in the handheld game console industry, Nintendo was the market leader with its Game Boy and Game Boy Advance and there was no major competitor in the industry (Ziesak, 2009). However, Sony, the leader of the video game console industry, entered the handheld market with its brand new console PlayStation Portable (PSP) at the
end of 2004, just after Nintendo released its new console Nintendo DS (NDS) (Ziesak, 2009). PSP had superior graphics and power, suited to the current trend in the video game market established by PlayStation, whereas NDS has lower power but featured two screens, one of which is a touch screen. NDS soon proved a huge success, especially among young children, girls and middle-aged people, selling 135 million units worldwide by the end of September 2010 (Nintendo IR Information, 2010). In contrast, Sony failed to take over the market this time; PSP had only sold 62 million units worldwide in the same period (Sony Computer Entertainment, 2010).

The success of the NDS gave a clue to Nintendo for its video game console strategy, that is instead of competing with Sony and Microsoft in graphics and expensive technology, what Nintendo should do is to do something different that can attract potential users such as female users and middle-aged users thus avoiding direct competition with Sony or Microsoft. Directed by this strategy, Nintendo released the Wii in 2006, just after Sony launched the PlayStation3, and one year later, Microsoft released the Xbox360. PlayStation3 and Xbox360 both featured high-definition graphics and large hard disk-based secondary storage, and both were really powerful systems that were the first to challenge the power of personal computers at the time (Wolf, 2008). By contrast, Nintendo’s emphasis is on game play rather than superior graphics; they focused on integrating controllers with movement sensors and encouraged games that capitalised on the intuitive nature of motion control (Ziesak, 2009). However, Wii, the console with much lower technical specifications, seems to have become the winner in this competition. By the end of September 2010, Wii had sold 75 million units worldwide.
(Nintendo IR Information, 2010), PlayStation3 had sold 38 million units worldwide (Sony Computer Entertainment, 2010), and Xbox had sold 44 million units worldwide (Dutton, 2012). Moreover, due to high definition video graphics and expectations for visuals in games, along with the increasing complexity of production, the development budgets of third parties have increased greatly for Xbox360 and PS3 (Wolf, 2008). Some developers saw the payoffs of Xbox360’s projects but not PlayStation3’s. Therefore, there is much less game software available for PlayStation3 in comparison to Wii, and even to Xbox360 (Wolf, 2008). The motion control that Nintendo introduced revolutionised game play in the market so much that even Sony and Microsoft had to follow the trend, respectively releasing PlayStation Move in September 2010 and Xbox Kinect in November 2010 (The Economic Times, 2010). After ten years of competition, therefore, Nintendo finally regained their position with its innovation of Wii.

Case II: The cooperation of Nokia and Microsoft in the Smartphone industry

Nokia is a Finnish multinational communications corporation that was incorporated in 1871 (The Nokia Story, 2011). It began its business by making paper and then rubber. It was not until 1912 that Nokia started business in electronics (The Nokia Story, 2011). As the mobile communication revolution started, Nokia launched its first mobile telephone in 1981, after which Nokia gradually became the household name around the world (The Nokia Story, 2011). By 1998, Nokia had become the leader in the mobile phone industry (The Nokia Story, 2011). Throughout almost the entire following decade,
Nokia was able to capture advanced technologies and keep bringing innovation into the industry. For instance, in 1999 Nokia launched Nokia 7110 with rudimentary web-based functions; in 2001 it launched Nokia 7650 with a built-in camera; in 2002 Nokia 6650, the phone with 3G technology was released (The Nokia Story, 2011). However, as the technology evolved, Nokia’s dominant position in the mobile phone market started to face challenges as competition intensified in the emerging smartphone segment from 2007 onwards (BBC News, 2011).

From 2008, Nokia’s share of the smartphone market fell from 39% to 23% in 2011 (BBC News, 2011). In February 2011, the new CEO of Nokia, Stephen Elop, warned the company as it was in crisis and described Nokia as standing on a ‘burning platform’ surrounded by innovative rivals who were taking its market share (Ziegler, 2011). Nokia had failed in bringing out new ideas and had also been slow to react to the growing smartphone competition from products such as iPhone and Samsung Galaxy S. The problems caused by these issues were apparent several years ago, however they were covered by the explosive growth of the mobile phone industry in general. The company’s shortcomings were exposed when Apple launched the iPhone in 2007 and started an era of touch screen technology. (BBC News, 2011). Although Nokia is still the world’s largest mobile phone maker, its market share was collapsing and profit margins were shrinking, as network operators were reluctant to stock phones with an old operating system (BBC News, 2011). Also, one reason for Nokia still maintaining the leading position is that the company is successfully selling good quality cheap phones in developing countries. In the third quarter of 2011, Nokia sold 90 million of these phones and just 17 million
Nokia smartphones (BBC News, 2011). However, it is the smartphone where the real profit lies, as suggested by the CEO of Nokia, Stephen Elop (BBC News, 2011).

Nokia has failed to adapt to the change in the mobile phone industry and was slow in reacting to the competition from rivals. In the effort of trying to reprieve itself from its mistakes, in February 2011, Nokia announced the strategic partnership with Microsoft. The deal laid out that Nokia used the Windows phone operating system for its new smartphone. The attempt of this partnership is to regain ground lost to iPhone and Android-based devices (BBC News, 2011). The reason Nokia formed this partnership with Microsoft is because it believed that in the mobile phone industry, the game had changed from a battle of devices to a war of ecosystems (Conversations by Nokia, 2011). This ecosystem will offer an alternative to the existing choices. Together, Nokia and Microsoft have some of the most globally recognised brands around the world (Conversations by Nokia, 2011). Nokia hopes that this strategic alliance with Microsoft can drive innovation that is at the boundaries of hardware, software and services. Moreover, this partnership is not only important for Nokia but Microsoft as well. At the end of 2010, Microsoft launched its brand new mobile operating system Windows Mobile 7 Series (Segan, 2010). However it did not achieve the success that Microsoft would expect. By October 2011, Microsoft has only 3% of the smartphone market and it hopes that the cooperation with Nokia will enable it to gain more of the market share (BBC News, 2011).

In October 2011, Nokia introduced its first smartphone to run the Microsoft Windows Phone 7.5 operating system: Lumia 800 and Lumia 710 (BBC News,
They were cheaper than their rivals and powered by services provided by Microsoft and Nokia, including Xbox gaming, Bing search engine, Nokia Maps, and Nokia Pulse that combines elements of social networking with location services (BBC News, 2011). Although the new smartphones have received many positive comments from the media and analysts, some people question whether it is too late for Nokia to fight back in the smartphone market (BBC News, 2011). There are many former Nokia users who have moved on to iPhone and Android-based phones and have become used to these platforms by buying applications and living their lives in an Apple or Google cloud. It will be a challenge for Nokia to convince customers to switch to a new alternative (BBC News, 2011). Nevertheless, to promote the coming smartphones, Nokia will start a huge marketing campaign called “The Amazing Everyday”, Microsoft will also support Nokia with tens of millions of dollars to advertise new Windows Phones in the market. However, Lumia 800 and 710 will not be released until the end of 2011, so it is hard to predict how well they will do now.

Case III: Market entry (vacuum cleaner industry): Dyson

Dyson Appliances Ltd is now a well-known domestic appliances company, accounting for a third of the UK market for vacuum cleaners (Trott, 2008). However, when it first entered the market in 1992, people with common sense
would definitely suggest that it would fail within just a few months, as Dyson appeared to be a small company, trying to sell a product that was expensive and also quite different from the conventional one in a very competitive market (Uhlig, 2000). At the time, Electrolux and Hoover were two of the largest world players in the vacuum cleaner market, dominating the UK market before Dyson’s entry (Trott, 2008). Especially, after Hoover introduced the Hoover Junior in 1936, which was the bestselling vacuum cleaner in the UK, almost all vacuum cleaners since were variations on the Hoover Junior design.

In 1993, The Dyson DC01 was launched the first bagless vacuum cleaner, using the new cyclone technology (Dyson, 2003). In the beginning, retailers were reluctant to sell Dyson’s bagless product, as it was twice the price of the brand leader, and they still preferred the less expensive, conventional vacuum cleaners made by famous manufacturers who had become household names (Kelley, 2011). Eventually, several home catalogue companies agreed to feature the product, but initially sales were slow. However as the DC01 was effective and reliable, the sales gradually increased, and eventually the national department store John Lewis also agreed to stock the product. It was from this point that Dyson’s vacuum cleaners’ sales started to take off and the DC01 became the bestselling vacuum cleaner in the UK in 1995 (Dyson, 2003).

With Dyson beginning to challenge the dominant position of Electrolux and Hoover, both companies decide to mount a strong defence of their products mainly via press advertisements, claiming that their traditional technology was more effective than Dyson (Trott, 20008). In contrast, Dyson believed if the
product was good enough it should require little promotion, so it adopted a strong product orientation and spent virtually nothing on promotion (Dyson, 2003). Nevertheless, Dyson still captured more than 50% of the UK vacuum cleaner market in less than four years since its release (Trott, 2008).

The revolutionary technology that Dyson brought to the market obviously changed the game that Hoover and Electrolux had been playing. With sales and market shares continuing to decline, the main manufacturers in the market adopted a different strategy taking into account the change in the industry. Electrolux decided to stay in the old game, with sales and market share continuing to decline. In contrast, Hoover and Miele decided to chase after Dyson by developing similar bagless vacuum technologies (Dyer, 2002). Hoover adopted centrifugal force technology, which was used by the oil industry to separate gas or sand from crude oil, and applied this technology to its Triple Vortex bagless vacuum cleaner range with an attempt to re-establish its reputation as the key player in the vacuum cleaner industry (Uhlig, 2000).

Dyson, in response to Hoover’s new vacuum cleaner, has had several legal battles with its rivals over patent infringement and advertising standards. In 2000, Dyson took Hoover to court to sue it for patent infringement. Hoover lost the case and had to pay a £4 million damage settlement to Dyson (Pierce, 2008). Also in 2000, the Advertising Standard Association ruled in favour of Dyson regarding an advertisement of Electrolux that claimed that its vacuum cleaner was more powerful (Uhlig, 2000).

Dyson invests heavily in R&D, as nearly 17% of revenues regularly go to the company’s R&D department. This is a ten times greater proportion than average R&D expenditure in the United Kingdom (Trott, 2008). As a result of
this research expenditure, Dyson, a company started with just one product, now have more than a dozen and almost all of them are accomplished with refined and advanced technologies that can bring innovation in the market (Trott, 2008) Dyson overtook Toshiba in 2006, becoming the third biggest vacuum cleaner brand in Japan with the DC12, which is specially designed for Japanese customers (Trott, 2008). By 2010, Dyson had 40% of British vacuum cleaner sales (Finch, 2010). It also reported £190 million operating profits for 2009, with a 23% increase in sales to £770 million (Finch, 2010).

**Case IV: Market entry (soft drink industry): Innocent**

Innocent Drinks is a UK-based company founded in 1999 that started its business by making smoothies and flavoured spring water (Innocent Drinks, 2011). It began as a small, entrepreneurial company with the basic principle of producing not-from-concentrate smoothies made of fresh fruit and juice (Innocent Drinks, 2011). The UK smoothie market has been growing steadily since 1996 (See Table 1) (Mintel Oxygen, 2011). When Innocent entered the market, although the volumes of sales of smoothies were very small when compared to the total fruit juice and juice market, they were increasing rapidly (Mintel Oxygen, 2011). However, there was no dominant brand in the smoothie market when Innocent launched. P&J was assumed to be the market leader by volume, but their leadership was not unassailable (Mintel Oxygen, 2011). Innocent was seen as one of the niche players when it entered. The company’s target market was young urbanites in London looking for a health fix and with entry into grocery distribution (Turner, 2008).
Nevertheless, the growth of Innocent was rapid. In 2007 it appeared 40th in the Sunday Times’ list of the 100 fastest-growing British companies as from 2003 to 2007, Innocent had more than doubled its revenues (Phelvin & Wallop, 2008). By 2011, Innocent had captured nearly four fifths of the market (Mintel Oxygen, 2011). Its closest rival is P&J, but in terms of market share, P&J is nowhere near shaking the dominance of Innocent (Mintel Oxygen, 2011).

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**Table 1: UK retail sales of smoothies, by volume and value, 1996-2001** *(Mintel Oxygen, 2011)*

Entering a relatively minor market as a small and entrepreneurial company with simple products as smoothies, Innocent managed to capture a major market share rapidly and also expanded the market size (See **Table 2**).
Table 2: UK retail sales of smoothies, by volume and value, 2006-2011

(Mintel Oxygen, 2011)

The value of the brand is a key to Innocent’s success. Since it launched in the market, Innocent has emphasised its “socially and environmentally-aware” stance (Mintel Oxygen, 2011). Ethics have been a critical lynchpin to the company, with the desire to “leave things better than when they found them” (Turner, 2008). Meanwhile, Innocent prints its pledge on every bottle of its products saying that they will donate 10% of its profits to charity (Mintel Oxygen, 2011). Innocent also set up its own charity, Innocent Foundation, in 2004 with the idea of bringing nature and communities closer together for mutual benefit (Innocent Foundation, 2011). The majority of funding goes to countries where Innocent sources their fruits (Innocent Foundation, 2011). This presents a message that Innocent is keen to communicate, aiming to explain the sustainability of sources and the returns to society (Turner, 2008).

Especially after Innocent launched 1 litre and kids’ packs, it has widened its target markets to families and young children, its unique message of sustainability had never been more important, as well as brand value (Turner, 2008). In 2007, Innocent introduced bottles that are 100% recycled and sourced bananas from Rainforest Alliance (Innocent Drinks, 2011). Innocent’s brand success made more companies aware of the importance of brand value, especially in terms of ethics. From 2008 to 2011, ethics rapidly became the top claim that companies would make when they launched their new smoothies (See Table 3).
In addition to being ethical, Innocent has also built a healthy and fun brand image. Innocent insists on making their smoothies and juice from fresh fruit without additives or preservatives (Innocent Drinks, 2011). The Advertising Standards Authority and the Department of Health announced that Innocent counts as two of the recommended five portions of fruit and vegetable a day (Utalk Marketing, 2009). Innocent believes that it is important to pay attention to detail. For example, they carry fun and engaging messages on their bottles and say “enjoy by” instead of “use by” (Turner, 2008). It is a small thing, but customers pick up on it and it builds brand loyalty. As suggested by Rawlins, Head of Communications for Innocent, “sharing the love” is one of the principles of Innocent, and therefore they are consistently looking for genuinely interesting things to generate talkability (Turner, 2008). Innocent realises the value of direct contact and tries to make their newsletters more personalised.
After the robust growth in the mid-2000s, the smoothie market has come under pressure throughout the recession as smoothies are positioned as a luxury product, which is therefore heavily dependent on consumer confidence. Sales in the smoothies market fell by 10.6% between 2006 and 2011 in current terms (Mintel Oxygen, 2011). Nevertheless, Innocent retains its unassailable lead. The brand’s latest moves include innovating on pack size, focusing on new flavours and also developing new products for children (Mintel Oxygen, 2011). It is a clever strategy considering almost four in five consumers like to try new flavours and parents are more likely than average to buy smoothies for someone else and for lunchtime occasions (Mintel Oxygen, 2011).

**Case V: Nissan electric car project**

Nissan Motor Company was founded in 1933. Nissan demonstrated a commitment to innovation since the company is founded. The Datsun Type 15 launched in 1937 was the first mass-produced Japanese vehicle (Conceptcarz, 2011). In 1960s and 1970s, Nissan continued to gain in popularity. The two energy crises of the 1970s especially triggered a rapid increase in sales of small Japanese cars, known for their excellent fuel economy and quality (Conceptcarz, 2011). During the 1980s, Nissan introduced its Infiniti line of luxury vehicles (Nissan Corporation Story, 2011). However, in 1999, Nissan faced severe financial difficulties and was on the brink of bankruptcy (Conceptcarz, 2011). To overcome these difficulties, the company entered an alliance with Renault S.A. of France and also started the
“Nissan Revival Plan” which was announced by CEO Carlos Ghosn (Conceptcarz, 2011). The company overcame the crisis and for the fiscal year of 2001, Nissan Europe returned to operating profitability and Nissan achieved a worldwide operating profit of 8%, which was the highest in the company’s history (Nissan Corporate History, 2011).

The current market share of Nissan in the US, along with that of Honda and Toyota, represents the largest of the automobile companies based in Asia that have been increasingly encroaching on the historically dominant US-based “Big Three”, consisting of GM, Ford and Chrysler (Mintel Oxygen, 2011). In its home market, Nissan became the second largest car manufacturer in 2011, surpassing Honda, with Toyota still very much the dominant first (Mintel Oxygen, 2011).

The recession in 2008 was particularly bad for the car market as it affected the sector’s biggest purchasers of new cars: high earning white-collar workers (Mintel Oxygen, 2011). The profit of leading car brands is in slow decline. Ford, Vauxhall, Renault and others are all suffering erosion in their share, with Nissan being a key beneficiary (Mintel Oxygen, 2011). This is partly because of the vehicle recall of Toyota and Honda in 2010 and also because after the earthquake in Japan on 11th March, Nissan managed to overcome parts shortages by shifting production to focus on those models it had enough parts to build (Lay, 2011).

In 2010, Nissan announced its brand new Nissan Leaf: an all-electric car producing no tailpipe pollution or greenhouse gas emissions. The Nissan Leaf was available in Japan and the United States in December 2010, and in the
UK in March 2011 (BBC News, 2011). By September 2011, deliveries of the Leaf had also reached Portugal, the Netherlands, France and Canada (BBC News, 2011). By October 2011, worldwide cumulative sales of the Leaf had reached 16,600 units (The Portland Press Herald, 2011). The launch of the Nissan Leaf allowed Nissan to reach fourth on the Fast Company’s list of the most innovative companies in the world (Fast Company, 2011). This was the first time that Nissan had appeared on the list, just behind Apple, Twitter and Facebook. Prior to the announcement about Nissan Leaf, Nissan had had no special environmental record, at least as perceived relative to its competition. This change in strategy was caused by the new emphasis on development, production and marketing (Chappell, 2011). The Leaf is the first mass-market all-electric car. As stated by the CEO Carlos Ghosn, it was a big decision to make for the company in 2006, as the investment was huge and no one could guarantee success (Fast Company, 2011). However, there were four reasons that drove the company to get ahead in innovation. As suggested by Ghosn, the first reason was that Nissan had the technology to evolve electric car technology. Number two was the environmental issue, as something had to be done about global warming. Number three was the fact that oil was becoming an issue and it was not only an environmental issue but also a political issue. The fourth element was that the Asian markets were expanding rapidly. In ten years, there will not be 700 million cars driven every day on the planet, but around 3 times as many, 2 billion. As there is already an emission problem with 700 million cars, there has to be an alternative to the current situation (Fast Company, 2011). So far since the release of the Leaf, Nissan’s bold strategy seems to be working well. The Leaf has received mostly positive
reviews from the media and the sales have been steady (BBC News, 2011). One reason for the success of the strategy is that the prime targets of the Leaf are women and young people who are more likely to try new things and also more environmentally conscious (Mintel Oxygen, 2011). Another reason could be the government’s financial support package for alternative-fuel vehicles (BBC News, 2011).

**Case VI: Apple’s reinvention with iPod**

Apple Computer Inc. was established in 1976 in California and incorporated in 1977 (Linzmayer, 1999). It was in 2007 that the company removed the word “computer”, reflecting the company’s ongoing expansion into the consumer electronics market in addition to its traditional focus on personal computers (Apple Press Info, 2011). In the early years, the personal computer was the only product that Apple produced. It launched the Apple I in 1976 and Apple II in 1977 (Hormby, 2006). The company was relatively successful as a new entrant until it released the Apple III in an attempt to compete with IBM and Microsoft in the business and corporate computing market in 1980 (Linzmayer, 1999). However, there were several vital problems of the Apple III such as that there were only three software programs available for it and it was also very prone to crashing when using the Save command (Coventry, 2006). The Apple III was turned out as Apple’s first commercial failure and also placed the company in financial uncertainty (Linzmayer, 1999). To rebuild its reputation, in 1984, Apple launched the Macintosh, announced by a 1.5 million dollar television commercial “1984” (Friedman, 2011). The Macintosh
initially sold well but follow-up sales were weak due to its high price and limited range of software titles (Hormby, 2006). The Macintosh Portable launched in 1989 was ended up as a failure (Linzmayer, 1999). However, having learned lessons from all these painful failures, Apple finally achieved success with the PowerBook and the Macintosh LC, which were both introduced in 1991 (Linzmayer, 1999). The success of the PowerBook and the Macintosh LC in addition to other software brought increasing revenue for Apple. However, following the success, Apple introduced a number of failed consumer targeted products including the Centris line and the Performa line (Linzmayer, 1999). The results were disastrous for Apple as market share and stock prices rapidly declined (Hormby, 2006).

To retain its market share and restore its reputation, Apple developed a few alternative platforms to Macintosh such as the A/UX (Linzmayer, 1999). It also entered an alliance with IBM and Motorola in 1994 in an attempt to develop a new computing platform, hoping that it could counter Microsoft’s dominant position (Linzmayer, 1999). In 1998, Apple introduced its new all-in-one computer, the iMac, and sold almost 800,000 units in its first five months (Apple Press Info, 2011). Nevertheless, during this time, Microsoft continued to gain market share with Windows, focusing on delivering software to cheap commodity personal computers while Apple was delivering a richly engineered, but expensive experience (Roughly Drafted Magazine, 2006). The targeted market of Apple is different to Microsoft. It is aimed at professionals and high-end consumers. Therefore, Apple products are much more expensive and also the operating system of Apple is very different to Windows, so it is hard for Windows users to switch to Apple. Apple was trying
to survive in a market that was almost monopolised by Microsoft Windows, and had only 5% of the market share (Markoff 2007).

The situation changed for Apple in 2003 after it introduced the iPod with the iTunes online store. It is a product that revolutionised portable entertainment. The iPod and iTunes changed the way people listen to music as well as the way people acquired it (Markoff, 2007). They created a new market and also transformed the company. The innovation of Apple was the ability to download music in an easy and convenient way. Apple built a new business model that combined hardware, software and services (Mahankali, 2011). By 2006, the combination of the iPod and iTunes became a nearly 10 billion dollar product accounting for nearly half of Apple’s revenue (Apple Press Info, 2011). Apple’s market capitalisation was catapulted from about 1 billion dollars in 2003 to over 150 billion dollars in 2007 (Mahankali, 2011).

The success of iPod inspired Apple, in 2007, to introduce another brand new product: iPhone and iTV, and expand its consumer electronics production lines (Apple Press Info, 2011). Meanwhile, Apple also focused on building its brand image by creating a new way of retailing. The company has designed its retail store with an inviting environment that is themed to reflect its corporation identity (Markoff, 2007). Moreover, Apple also tried to capture customers’ loyalty by emphasising its philosophy of comprehensive aesthetic design and its distinctive advertising campaigns (MacNN, 2006). As a result, Apple has established a unique reputation in the consumer electronics industry. This includes a customer base that is devoted to the company and its brand. This also benefits the company’s traditional product: personal computers. While developing new products including the iPod and the iPhone,
the company has kept innovating the Mac and its processing capability (Markoff, 2007). Under the Halo effect of the success of the iPod, the computer sales for 2007 were 35% higher than in 2006 (Apple Press Info, 2011). It was a tremendous growth considering the Mac is much more expensive than those products of the other dominant players that run on Windows systems. In 2008, Fortune Magazine named Apple the most admired company in the world (CNN Money, 2008). Apple also managed to maintain its position in 2009, 2010 and also 2011 (CNN Money, 2011).
Appendix 5: E-mail to Interviewee

Dear Mr. / Ms,

I am a second year PhD student from management of projects, University of Manchester, and for my research I am undertaking a study to apply game theory to incentives for innovation especially in the area of modern business.

In brief, this study is trying to identify the incentives that could drive a company to engage in innovation and how these incentives could arise. The study is also trying to understand how to use innovation to change the game of business.

Participants will be asked to take part in a recorded individual interview, either face to face or via telephone as preferred. A set question regarding the research topic will be asked. The interview will take around one hour.

Participants will be provided with transcripts of their interviews. Participation is voluntary and if you are interested in taking part, please email me at yao.wang-2@postgrad.manchester.ac.uk and I will send you further information regarding the research. Please note that replying to this email does not automatically entail your participation.

Kind regards,

Yao Wang
PhD Student of Management of Projects

School of Mechanical, Aerospace and Civil Engineering

University of Manchester

Supervisor: Dr. Peter Fenn
Appendix 6: Participant Information Sheet for Interviewee

Title of project

Application of game theory to incentives for innovation in modern business

Introduction

In order to survive and grow in the increasingly competitive market, a company not only needs to focus on its own business, but also needs to anticipate the next move of its competitors. It’s just like a high-stake game. There are a set of players: competitors, suppliers, customers. There are rules, such as price, common belief in the industry, regulations and policies. The added value that different companies can bring to the game of business is different as well. However, unlike games of sport, games of business are not always about winning and losing; companies can succeed without requiring others to fail, and can fail no matter how well they do. As suggested by Brandenburger and Nalebuff (1996), the biggest opportunities and the biggest profits come not necessarily from playing the game well, but from shaping the game to your own advantages. Through defining your competition: who you are competing with; what you are competing at; where you are competing; influencing what value each player brings to the game, and deliberately changing the rules of the game itself to your advantage, the boundaries of market could be expanded and a win/win situation could be achieved.

The objectives of this study include exploring how a company can change the game of business through innovation by applying game theory as a tool to
analyse the situation when it has to make strategic decisions and achieving a win/win situation for companies in the same industry.

Being part of this study, participants will be able to understand the concepts of game theory and game changing, especially in terms of how to compete successfully. Moreover, this study can offer participants a fresh way of considering innovation as well as competition.

**What will I be asked to do if I take part?**

If you decide to take part, you will be asked to complete the consent form and send it back to the researcher.

- Once you send the consent form back saying you agree to take part in the research, an interview will be arranged at a place and time appropriate for you and the researcher.
- Either digital audio or video recording, as preferred, of the interviews will be taken.
- A topic list will be provided covering a broad range of potential questions for the researcher to ask, which will include:
  
  i. Briefly ask participants' background and why they are interested in this research.

  ii. Ask participants what they think of innovation and find out whether they have working experience in innovation. If yes, ask for detail; if no, ask for reasons.

  iii. Ask participants what they think could drive their companies to engage in innovation.
iv. Explain the concept of game changing and ask participants whether they have any working experience in game changing. If yes, ask for detail; if no, ask for reasons.

- The researcher will use open-ended questions to obtain a wide range of responses while also using some closed-ended questions to gain more detail and depth in the areas of interest.
- The interviews are expected to last up to one hour, but participants are free to talk as much or as little as they like.
- Recording will be transcribed for analysis.

**Will my data be confidential?**

All data provided will be treated confidentially. Any identifying information within the interviews will be removed from the transcript. Only the researcher will have access to the original recording and all the recorded data will be destroyed after transcription. Confidentiality and anonymity will be guaranteed. The researcher will hold consent forms and transcripts in a lockable file in the University of Manchester for 10 years following completion of the study after which time they will be destroyed. Participants will be labeled with a non-identifying ID number for the analysis stage. The transcript of your recordings will be sent to you if required.

**Do I have to take part?**
You do not need to take part in the study and if you do enter you are free to withdraw at any time without having to give a reason for withdrawing and without detriment to you. If you wish, your data will be destroyed.

**Is there any potential risk for me if I take part?**

There are no anticipated risks to participants associated with the study. However if the study raises any issues, you will be able to discuss any matters further with the study supervisor Peter Fenn, whose contact details will be made available.

**Where can I obtain further information if necessary?**

For further information, please contact Yao Wang at yao.wang-2@postgrad.manchester.ac.uk.
Appendix 7: Interviewee Consent Form

Title of Project: Application of game theory to incentives for innovation in modern business.

The participant should complete the following part him/herself

Please Initial If Applicable

1. Have you read the Participant Information Sheet? 

2. Have you received enough information about the study? 

3. Do you consent to be audio taped as detailed in the Participant Information Sheet?

4. Do you understand that you do not need to take part in the study and if you do enter you are free to withdraw:
   • at any time
   • without having to give a reason for withdrawing
   • and without detriment to you?

5. Do you agree to the use of anonymous quotes in any poster/article/presentation that might result from this study?

6. Do you agree to take part in this study?

Email address of participant: __________________________

Name of participant: ___________ Signed: ___________ Date: ___________

Name of researcher: ___________ Signed: ___________ Date: ___________

Would you like to receive a copy of the transcript of your
Would you like to receive a text message reminder for interview in addition to the email reminder?
If yes, please provide your mobile number:
_________________
Appendix 8: Transcript Sample of the Semi-structured Interview

Interview on 19/02/2012, lasts for 44:34.

R = Researcher; A = Interviewee A.

R: Could you please first introduce yourself and what is your role in this company?

A: Right. My name is *******, and I’m the director and also the designer in Company A, and I also design works from the concept, idea to the execution and implication and everything. Uhhh, yeh, that’s it.

R: Ok, so how do you define innovation in your company? Because I’ve seen in your website that like a slogan, you put “innovative company” that sort of thing. So in your view, what do you understand about innovation?

A: It just a simple way, I can, I can see that as a different way of thinking, or, in our industry or in our company, it doesn’t mean like a, uhhh, say groundbreaking ideas or something that will make a big, big differences. But it means, that we like to add up any changes, taking in any new ideas and use them in projects. And the innovation for us it just should be able to use, to be open and, about new ideas, have them, use them, manage them, track them, and have them in our products. Not…it’s a board way of concept, but to me, it’s, uhhh, simple I say, the different way of thinking, and see different solutions or different problems, or not even problems, different solutions for
different opportunities. And that’s the way we’ll like to think or we see these innovations.

R: Ok, when you say that, uhhh, different way of thinking, you said that you are applying to the products? What do you mean by products?

A: We do, uhhh, we are in the residential market, and we design, build, uhhh, one of unique houses, right, then this is our product, the house is our product. But we are not the mass builder, we are designing the house, we design the product and within that product we’ve got so many small details, pieces and pieces, which means, they come together, it makes the whole product presentable to our clients as a building. That building on its own, imagine from constructing, the basement construction, underground car park, pool, leisure floor, we are in luxury market, (R: Ok.) to the roof, internals everything, I think there are may be thousands of different materials, and they are doing the things that we cannot apply but we can do them in a very standard way within the standard train, but we can change them, we can introduce new materials, we can introduce new methods, we can introduce new techniques, and we can ignore them, not to do it, and doing it in the traditional way. And that’s the way we think our products are different from that prospect. Using innovative materials, innovative methods, and I think it’s being different to the standards are actually practicing at the moment is what I can say that.

R: Ok, uhhh, so is innovation part of the strategy thinking of your organisation?

A: Uhhh, yeh, actually, we like to think, we like to have it as a, we are not a very big organisation as you can see, and we only a small team. I think, I don’t
think innovation in a small team is much easier than it in the big structure. Because in a bigger structure, you need to have all everything all sorted. Because introducing innovation means changes, (unclear), and it costs money, time. In the small team we could say you’ve got the control and you can manage it easily. Within a big team, you need a bigger structure for that and I think in the small one, what we do is we like to have it as a culture not as a procedure that you need to tick the box. Then it’s important to all our team members to be part of it. And if you can see a different way of doing things, if you come across with different things, just brings it and we’ll talk about it.

R: So innovation for your company is about doing things different?

A: Yeh, the way I see is, uhhh, my idea is that three principles we got: time, cost, and quality, in construction, and any ideas can improve… bring the cost down, save on time, and provide a better quality, any ideas fitting that (unclear), it is an innovative idea.

R: Ok. So do you have any stories about innovation in your projects?

A: There are…lots of examples. In this…for example, in this market the land value is very high because of the location and you pay a lot for the land, and you want to maximize the property you want build there, but because being in the green field and consolation area you are limited. Then now the basement solutions are very popular. Uhhh, because we pay a lot money for the land and you want to build as much as possible we can. But sometime the planners don’t let you because you are in consolation area, in green field, but building a basement is ok because no one is bothered about it. But how to
construct a basement? The basement now we are built is not a traditional one, like a damp… you can imagine the old days when you are talking about the basement it reminds you about a damp, dark space, not useable. The example of the basement…well, I can show you, it got underground swimming pool, leisure floor, high ceiling, even lights to the basement. It’s not dark at all and very useable. And in that basement construction, because of the level of (unclear) outside you have to make sure that you got the structure (unclear) the building is also waterproofed. And combination of that needs a bit of thinking. And the introduction of using material named ICF, it’s a plastic panel, very heavy, filled a bit concrete. And that concrete is waterproofed. Then when you applied it waterproof the building, it’s very structure (unclear) concrete, and also very quick. Specially imagine thinking that it’s five, six meter down for the basement which got the pool inside it, you want it to be quick. We tried this one, but we fail… we’ve seen they miss in so many other projects that people don’t like to do it. Or in this one with this everything thinks that you shouldn’t do that, they haven’t been tried. They’ve tried in Europe, even in the UK, in the commercial (unclear), but in residential people are so reluctant to take different methods, alternative methods. They want to stick to what they know, traditional ways, just block work, fill the cavity with concrete, do external waterproofing. But we think we need to take this route, we took it, it was very successful story, without that we couldn’t build that basement. Because of the amount of water, underground water, we couldn’t cope with that, we couldn’t build it that quick. We built it and the final result was fantastic. And everyone liked it but, although we’ve done it now, even people can see that we’ve done it, for the other projects they may want to do they
may still be reluctant to do it. Because they think that one as a new, or something not been tried for years and years. Or just maybe being conservative, I don't know.

R: Who are being conservative? I mean, you mean the owner? Or?

A: Yeh, owners or other (unclear) person. Other builders. Because I found in the residential, in commercial… other building like bridges, roads, they adopted any new ideas. But in the residential, in the house building industry they just… everyone, like clients or builders I think they like to stick on what they know. For differences… I don’t know, maybe, there is definitely some commercialism behind it because if they can sell product with the same, traditional way they’ve been built for so many years, and they still can sell those products, they wouldn’t bother changing it.

R: Is it because of the cost when you say they wouldn’t bother to change?

A: Uhhh, for big organisation, I’m sure it will cost more. But, if done properly I don’t think it will cost more than the traditional…. If you bring into account of all, maybe direct costs in the first place is a bit more, but when you bring it all things into consideration, it won’t cost in the long run. That’s what I think, that what we have experienced. What I’m saying in the quality, this, maybe you are experiencing yourself the house you living, the quality is very low and people’s expectations are low I think from the housing industry. In your house, you, you just compare the cars, TV, the other things you got in your house, and with the quality of the house you living in there, is nowhere near good at all to be honest. And the commercialism I’m saying as long as people don’t bother and still buying these traditional buildings, not efficient, like the bills for
utilities are going high as long as people don’t bother and still buying them then why (unclear) builders bother about it and they will keep building them and just won’t improve. Maybe the recession triggered, created some competitions for the companies to think wise. Because now people are more concerned, the economical situation is not good, and I can see different companies (unclear) start to think differently, in comparison with when market was good, companies just building and building the same thing and just throwing to the market and just, there were market for that.

R: You said that the owner, the developers they do resist the change (A: Yes), so how did you overcome... uhhh, convince them, you know, to apply new methods?

A: Let me explain how we operate, we didn’t have to convince anyone because we are in charge of building from zero to hundred, then we buy the land, we in charge of the design, we build it, and we sell it. Then as long as you are convinced in our team that we need to take it, we will take it, right? But when you do that for a private client for example, they may resist and (unclear) or even when we are talking to people who are asking “oh, if you can do this for me...” they say “oh, that’s fine”. But they don’t want to do it themselves. Probably don’t want to take the risks. There are some risks involved in that. Always there is a risk involved when you taking a new item. I think they don’t want to take the risks. And maybe they want to see it done maybe for ten years and it is proved that it is working, and then try to implement in their own projects. But... I found that people are... developers, builders, clients, the whole house building industry are very resistance about the changes and new ideas. That’s what I have found, me personally.
Although it will save them cost I believe and it will save them...time, but, it’s different from the rest of Europe I’ve seen for example, in Germany and the rest of Europe, the new ideas are more welcomed, in our section, uhhh, I don’t know about the other sections. And it’s not to me to find out why, but maybe some culture, thinking, or being, as I said, more conservative not taking the risks. There everyone is trying to pass the risks, from here to there and just like...insurance that type of things, everyone is passing the risks to someone else and no one wants to take the real risk. Stand there and say “ok, I will try this”, with good knowledge taking the risk will be reasonable. Because in our team we got different skills for example we got... because some developers just developers and they outsource everything, in our team, we got teams of structure engineers, different legit backgrounds and different management backgrounds, then we got the skills there that we can make decisions that “yes, this risk is manageable, we can mitigate the problems”. I don’t know how will you... but we think we’ve got the enough capacity to deal with any risk. And we can’t see these for example new ideas of building this basement as a high risk, oppose to the actual gains we’ll get from it. Then we take it. But I think because the different bodies they haven’t got maybe all excuses in house and all sources of the design, the structure, the different things, and other companies just, they are being paid to do the design they don’t want to take that much risk. (Unclear) they just want to do the traditional way and not to take any risk, because they will be paid and the job will be done. I think you should introduce that in your company; you should have some structure for that, to go down that route. Otherwise you can easily just follow the rest and not be involved in that.
R: How competitive is the construction industry? Like, you said your company is small, so can you actually compete with other companies?

A: Yeh, it is actually a very competitive market. Because of this recession period, lots of small companies now are disappeared, and we don’t have that much of the competition at the moment because a lot of small companies couldn’t stay, and they withdraw… they don’t exist anymore. But still the competition is tough, because there isn’t enough demand at the moment for buying the houses, especially in the market we are working, the high value ones, and we need to try harder and harder to be able to sell products.

R: Ok, how you compete, when you say it is competitive? How can you describe the competition I mean? How does it work?

A: We got two different sections… departments. One department we build the houses we sell them, right? And then we need to look at the market in that section. We’ve got the completed products and we are presenting it in the market. Other section we do work as a principle contractor, we tender, put the price, and if we win it or we lose it.

These two sections are different, and then we got two different markets. As a house builder, there are different elements, when you build the house; you know you are competing against other house builders in the luxury market. You need to bring into the account the area you are building the house, uhhh, how… even the road in this area, there are different roads that you can sell them, and they are better than the road you count, even in the high value one, what will be the end results? What types of the products you do? (Unclear) marketing you do? What state agents to use? What sort of uhhh, media, PR the thing you do
just to promote yourself? We compete on that side, but for the tender, yeh, we price it up and sometimes we lose it sometimes we win. But we found, I found that then we know about the job in tender (unclear) is not the best time. The job we want, the job is hard to build the relation with clients, much earlier than the tendering stage. Then they approach us because of the quality of the work we do, because our products are different, because they love our products and then build the relation… I create the trust element then sometimes they don’t bother to go to the tendering stage. But when we go to the (unclear) just the tendering, and we just, just a solid figure against some other companies we may lose because the quality we do, the concept back of it, in the first place maybe we don’t look competitive and we lose the job on it. But to be honest with you I’m not interested in that sort of jobs, we like to stick to what we do good and do it in that way. Being competitive in the market is not just about the price I think. If people like our products we can work the price within their budgets. Different with value (unclear), innovative ideas, and… yeh.

R: I found that you have recently won a reward (A: yeh), and would you consider that reward as an incentive? Could you explain more about the reward?

A: The project was in the luxury market, one of our houses, about the design, we won that, design and build actually, uhhh. And, it is encouraging, but…

R: Did you actually consider why you are doing your project? Like, in general, for example, “I'm doing this project because I want to win this prize”.

A: No. When we gave this project… there are different rewards, and we just… actually have that project in one of those lists, and we won that reward. But it
wasn’t intentional because we do that and some of these rewards can be a bit commercial, some of these… you know just different elements, to be honest. And you can’t just concentrate on that bases. But it is good to win that.

R: Is it encouraging for you next project?

A: If you ask if you haven’t… but I don’t think it changed anything, I don’t think so, but it’s good to have it.

R: But it is good for your company, your reputation?

A: Yes.

R: you said like, is your company always been innovative from the beginning, or as you said because of the economics, the recession, so your company tends to be more innovative?

A: Yes.

R: So before recession, maybe, for example, your company will less prefer to be innovative? (A: Yes) So why your company is tend to be more innovative after the recession, or because of the recession?

A: I think is because of the competition, because of the… again, there is actually a mini story about it. Now we are… we used to and we still do the big projects, not big projects, big houses. Now we are more (unclear) to the smaller ones, right. We say we go to that market, “this is our new collection”, we are going to compete against the big builders that they are building, as I said, box. We won’t build a box, we would innovative, we keep the cost down, we will compete against them with the same price they are providing. What
we give them are options. We give people more light, under floor heating, energy efficiency, materials, everything. And they feel... when they make comparisons, now people are got lots of options, lots of properties out there for sales. And people can go to Agent X and search, and (unclear) lots of, for example, properties in that range, all the same price, what makes a difference? We think being innovative will make a different.

R: So do you think there is a major, your main competitor in this market? Do you think there is one? Is there a leader in the market your company is operating?

A: uhhh, in this section we work, no, there isn't one. No like a dominant company.

R: So everyone kind of like have a bit of market share?

A: Yes.

A: So how you make your company stand out from all these companies? Because people must choose you for a reason. If they already know you it's another story. But if they are just new customers, why you think they will pick you? What do you do to make them pick you?

R: There are different things we can do, like how to present or promote ourselves. But our main focus, we've got two main things. We think we are more innovative; we like to add up changes and also are our attentions to details. That's what we talk about. (Unclear) attention to details, the details we can ignore, but if we can, don't ignore, we will make it work. But how we send this message to the clients, we try to use different things. The actually media
publishing, PRs, and cases studies, interviews, clients’ questionnaires, and we try to cover as much as we can, and... yeh, and this can (unclear), there are different marketing elements on that.

R: So are you trying to differentiate yourself from competitors? (R: Yep) So as you said you are trying to be innovative, like provide more light, better quality, and more ideas. So do you think the market trend, the market you are operating, has it changed? For example, before, big houses are popular, now people more like basements. So has it changed?

A: Uhhh, this section we are now... the reason we are now concentrated on the other (unclear), because other sort of properties, because they are more affordable, because of the economical climate. It doesn't mean that there is... that market was always there and still there.

R: Is it still the same?

A: Uhhh, no, it's not still the same. But I think that market needs some new ideas, again, you can't build the same houses you used to build five years ago and still sell them. You may sell but it may take one year to sell, right? But you want to change it, to be able to sell it.

R: So has the customers’ preference changed? Like before they prefer big houses, now they prefer smaller one, better quality, and more space inside?

A: Uhhh, about the size, I don't think there is different sections, different sort of demand for those sort of houses. I don't think their preference has changed. But I think there are... still I think the expectations are low from clients. They, I think they can ask for more, I think... because they haven't
seen that quality product, because our luxury market is a bit limited and some people can afford spending, I don’t know, two, three millions for a house, they know these things and their family, they can apply that. But for mass market, the people, the expectation is low… I don’t know, sometimes I’m surprised, the price they are paying for the very low quality house. Because I think the standard is not high still.

R: As you said like, for example you said before, now people quite like basement, but you are trying to build the basement which is not traditional (A: exactly). Is it only recently year people are like to use basement as you can actually use it as a… (A: as a real, yeh) Is that only appearing recent year? Is that a recent change?

A: In this area, yes, because of the value of the land.

R: Is it also because of the recession?

A: No, because the building of the basement is not, it’s very cheap, to be honest, the way we do it. Then it won’t affect the price that much. It’s because of the price of the land; they want to use as much as possible the basement.

R: So you said your company built the basement really successful, it’s really high quality. Is this one point that you trying to be different from others, showing them that “we can build the basement better than you”?

A: Yeh, that can be one of the points actually. Because as I said it’s still we you said you got that basement, some people say “oh, it’s not that useful space, I’m not going to pay you that money for that”. But when you have the people in that basement who said “I don’t think I need a basement”, then you
can sell that product. But you may still have the basement but not useful and people will say “oh no, that’s a dead space”.

R: Ok, so as you said, when you do innovation, there are risks. So do you think recession could encourage you to do more innovation?

A: It does yeh.

R: And the change in the industry, for example like people prefer basement now then your company will put more thought about basement?

A: Yes. And I think in this market you need to be a couple of steps... Uhhh, not to... you don’t want to follow the people, you want to be ahead, you want to introduce the ideas and get the people to know that. You don’t want just people say “we like the basement” and then say “ok, we will build the basement”. You know what I mean?

R: Yeh. You also mentioned that there is not enough demand now for the house. (A: Yeh) So has your company ever thought about maybe, find more potential customers, maybe not currently exist?

A: Yes, like creating the demand.

R: Yeh, or expand the market. Because your company’s targeting market is like luxury and high value houses. So have you ever thought about, maybe to target a different market and to bring more potential customers?

A: That’s the way actually we are going to the more affordable side at the moment. Like not that high value properties, like a, like a say two hundred to three hundred thousand pounds of properties. But with the elements of two,
three million properties introducing on them. Then people are saying that...this may answer your previous question that people say “oh, these are building three millions, four millions houses for the footballers, now I got that house... not that house, it’s a smaller scale of it, for two hundred.” Do you know what I mean?

R: So it’s kind of like moving to another segment of the market? (A: Yes, exactly) From the luxury to the normal. So is that actually works for the company? Is that bringing more customers?

A: Yes, because you can imagine that the people can afford to pay three million, four million for a house, in comparison with the people can pay two hundred fifty thousand for a house. I’m not approaching to the first or second time buyers than the high profile clients then we are having our bigger share of the market in comparison with that what we were doing.

R: Ok, yeh.

A: Another thing that just across my mind is about the... some regulations can have an effect on this.

R: Has the regulations, the policies stopped you?

A: A lot. Because the planting department, the low (unclear). Getting something different, the approval for that from different (unclear), they just put something that is out of character and refuse it. And it is a challenge; it’s a real real challenge that we need to fight to get what you want. And as a business model, you may just give up.

R: So what sort of regulations?
A: The main part for the planting, when you apply for the planting permission, you are dealing with the local authorities, with the planting officers. Just reviewing your case and saying is that following the guidelines or not. And these guidelines are very, how do you say, are very objective. The officer, the most of them, because they don’t want to take the risk, because they are just some people sitting in the office hired by the local authorities, they just take the easiest route. Because there is no reward for them, for approving a very contemporary or modern one. People may object to that and maybe in trouble, maybe lose their job I don’t know. But they like to be very conservative, the planting authorities. And I’m very very surprised it still in this difficult market, the new ideas is still not welcome with the planting authorities.

R: For some of your projects, are there companies copying you?

A: Yes.

R: Are you happy about that? Or ?

A: Yeh, I like to… because they wouldn’t stop doing that and I would go somewhere else. Each of our project, we just change, it’s a constant change.

R: So are you happy your competitors copy your ideas?

A: Yes, it raises the whole game.

R: You mentioned the game, for my research, my research is about game theory. It’s about that business is a game. There are five elements in each game: players, added value, rules, tactics and scopes. To change a game, you have to at least change one of the elements. So as a conclusion, may I ask you something briefly?
A: Yeh, sure.

R: When you say your company moved from luxury market to normal market, do you think you expand the boundary of market in which your company is operating?

A: Yes.

R: So you kind of expand the game for your business? (A: Exactly, yes) Is there anything you can think of that your company has done to change the game of the business?

A: I don't think it's only coming from us; it's coming from two or three companies. In these new ones, we introduce some luxury elements that’s… for example the underground car park in one of our houses, or lift inside the house… more people can use this, they can see this basement space more useable. They got the lift, easy access; they got the light. I think now we, more working on these basement projects, I think the game completely changed.

R: Yeh. When you brought your company to the normal residential house market, as you said your reputation is like building really luxury house, and when people see you they think that “oh, you build nice houses”, so your reputation is higher than the companies in the normal house… (A: Yes, exactly) Then in the luxury house industry maybe everyone can build luxury houses, (A: Exactly) so you are just a normal one. (A: Yes) But when you move to the normal house industry, people see you differently, people see you as a company with really good reputation, high quality. (A: That’s right) So when you move to that market do you think it is easier to operate?
A: Yes, I think it is not as easy as we may think, but people know that... because we are not going to lose our reputation just building normal, ordinary things, then whatever we do will be different. And I think our concept is better and people... we receive a good demand. That’s why we are doing that.

R: That’s why you move to the normal market?

A: Yes. Because our experience in this luxury end has given us enough... we’ve tried different things and now we’ve got that capacity. But our market is limited; we don’t want to build two, three house a year. We can build maybe twenty houses, by smaller ones, but let’s use that experience somewhere else and have more demand. As you said, change the players.

R: Yeh, so you changed your added value that you bring to the normal market as well.

A: Yes, exactly. I like this idea of competition. And I think it will raise the game and definitely will improve the quality. And people can... because when the expectation is low, sometimes it is difficult. When the expectation is high that people know what they want, people know what they can get, that they are fussy, they are bothered about the details, then it will improve. I think in the residential market, residential housing building, there is lot of room for improvement in the UK. And I think the company... I think it will cost a lot for the big organisation, because they need to be in charge, they need to be able to control it. In small practices it much easier to track these things, change them, and apply them. But in big organisation it is difficult because you may lose everything if you can’t track it. But if they can implement that sort of thing, because the big ones can make a big impact. We make, I don't know, maybe
five, six houses a year, we can’t make a big impact in the whole story, but
when big companies start doing this, that’s the time we can see better quality
houses, better (unclear). And it just, when we are talking about innovation,
about, I think it just very simple things, it just better layout, better living space,
more light, simple ideas everyone can think about it. And it’s not about the
cost, it just about thinking at that way. And for different reasons, it doesn’t
work.

R: Ok, thank you for your time, I think that’s everything.

A: No problem.
Appendix 9: Covering Letter to Questionnaire Participant

University of Manchester
Oxford Road
Manchester
M13 9PL
Email: yao.wang-2@postgrad.manchester.ac.uk

Dear Sir/Madam,

I am a PhD student of the University of Manchester. The topic I am researching is the application of game theory to incentives for innovation in modern business. This questionnaire is part of the research and your responses are important in enabling me to obtain as full an understanding as possible of this topical issue.

The questionnaire should take you about 15 minutes to complete. Please answer the questions in the spaces provided. If you wish to add further comments, please feel free to do so. The information you provide will be treated in the strictest confidence. You will notice that you are not asked to include your name or address anywhere on the questionnaire.
The answers from your questionnaire and others will be used as the validation procedure for my research project.

Please note that the participation is entirely voluntary, and it is up to you to decide whether or not you wish to take part.

If you decide to participate, please complete the questionnaire and return it to me at yao.wang-2@postgrad.manchester.ac.uk

Should you have any queries, please contact me at the same email address.

I’m grateful for your kindness, and thank you for your generous help in completing this questionnaire to help me with my postgraduate research.

Yours faithfully

Ms Yao Wang

Student at the University of Manchester
Appendix 10: Participant Information Sheet for Questionnaire Participant

Title of project

Application of game theory to incentives for innovation in modern business

Introduction

In order to survive and grow in the increasingly competitive market, a company not only needs to focus on its own business, but also needs to anticipate its competitors’ next move. It’s just like a high-stake game. There are a set of players: competitors, suppliers, customers. There are rules, such as price, common belief in the industry, regulations and policies. The added value that different companies can bring to the game of business is different as well. However, unlike games of sport, games of business are not always about winning and losing; companies can succeed without requiring others to fail, and can fail no matter how well they do. As suggested by Brandenburger and Nalebuff (1996), the biggest opportunities and the biggest profits are not necessarily from playing the game well, but come from shaping the game to your own advantages. Through defining your competition: who are you competing with; what are you competing at; where are you competing; influencing what value each player brings to the game, and deliberately changing the rules of the game itself to your advantages, the boundary of the market can be expanded and a win/win situation can be achieved.

The objectives of this study include exploring how a company can change the game of business through innovation by applying game theory as a tool to
analyse the situation when it has to make strategic decisions and thus achieve a win/win situation for companies in the same industry.

Being part of this study, participants will be able to understand the concepts of game theory and game changing, especially in terms of how to compete successfully. Moreover, this study can offer participants a fresh way of considering innovation as well as competition.

**What will I be asked to do if I take part?**

If you decide to take part, you will be asked to complete the consent form and send it back to the researcher.

- Once you send the consent form back saying you agree to take part in the research, the questionnaire will be sent to you by e-mail.
- The questionnaire will take you around 15 minutes to complete. It will be totally anonymous. There is no personal information required on the questionnaire.
- After you complete the questionnaire, you can send it back by e-mail to the researcher.
- Your answer among others will be gathered together for further analysis as a part of the validation process for this research.

**Will my data be confidential?**

All data provided will be treated confidentially and anonymously. No identifying information is asked for on the questionnaire. Only the researcher will have access to the original copy of the questionnaire completed by the participant. Confidentiality and anonymity will be
guaranteed. The researcher will hold consent forms and the questionnaires electronically at the University of Manchester with password protection for 10 years following completion of the study after which time they will be destroyed. Participants will be labelled with a non-identifying ID number for the analysis stage.

Do I have to take part?

You do not need to take part in the study and if you do enter you are free to withdraw at any time without having to give a reason for withdrawing and without detriment to you. If you wish, your data will be destroyed.

Is there any potential risk for me if I take part?

There are no anticipated risks to participants associated with the study. However if the study raises any issues, you will be able to discuss any matters further with the study supervisor Peter Fenn, whose contact details will be made available.

Where can I obtain further information if necessary?

For further information, please contact Yao Wang at yao.wang-2@postgrad.manchester.ac.uk.
Appendix 11: Consent Form for Questionnaire

Participant

Title of Project: Application of game theory to incentives for innovation in modern business.

The participant should complete the following part him/herself

**Please Delete and Initial If Applicable**

<table>
<thead>
<tr>
<th>Question</th>
<th>YES/NO</th>
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<tbody>
<tr>
<td>1. Have you read the Participant Information Sheet?</td>
<td></td>
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<tr>
<td>2. Have you received enough information about the study?</td>
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</tr>
<tr>
<td>3. Do you consent to complete the questionnaire electronically?</td>
<td></td>
</tr>
<tr>
<td>4. Do you understand that you do not need to take part in the study and if you do enter you are free to withdraw:</td>
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<td>• at any time</td>
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<td>• and without detriment to you?</td>
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<tr>
<td>5. Do you agree to the use of anonymous quotes in any poster/article/presentation that might result from this study?</td>
<td></td>
</tr>
<tr>
<td>6. Do you agree to take part in this study?</td>
<td></td>
</tr>
</tbody>
</table>

Email address of participant: -
Name of participant:

__________________ Signed:__________________ Date:______________

Name of researcher:

__________________ Signed:__________________ Date:______________
Appendix 12: Sample of Questionnaire

Please complete all the questions by following the instructions

1. I think incentives for innovation can arise from interaction with competitors.
   Agree [ ] (GO TO Q2) Uncertain [ ] (GO TO Q2) Disagree [ ] (GO TO Q3)

2. What are the possible incentives that could arise from the interaction with other companies?
   Please tick as many as is appropriate
   a. To compete with others
   b. To avoid direct competition with others
   c. To develop the company’s own advantages over others
   d. To stand out from others and be different
   e. To stay ahead and be the first mover in the market
   f. To gain more market share and maintain the company’s market position
   g. To switch market focus and targeted market
   h. To cope with imitation

3. I think incentives for innovation can arise from interaction with customers.
   Agree [ ] (GO TO Q4) Uncertain [ ] (GO TO Q4) Disagree [ ] (GO TO Q5)

4. What are the possible incentives that could arise from interaction with customers?
   Please tick as many as is appropriate
a. To meet customers’ expectation
b. Stable customer base could give rise to the confidence to innovate
c. To establish and maintain a good customer relationship
d. To attract more potential customers

5. I think incentives for innovation can arise from interaction with the external environment.
   Agree □ (GO TO Q6) Uncertain □ (GO TO Q6) Disagree □ (GO TO Q7)

6. What are the possible incentives that could arise from interaction with the external environment? 
   Please tick as many as appropriate
   a. To cope with different situations, offer different solutions, and make the most of different opportunities
   b. Supportive attitude towards innovation in the market/industry
   c. Recession trigger
   d. To adapt to changes in the market
   e. To adopt law and regulation changes
   f. Effective patent protection
   g. To cope with market saturation and market limitation
   h. To meet the unmet needs and fill the gap in supply and demand in the market
   i. To find more opportunities in other market areas

7. I think incentives for innovation can arise from interaction inside the company.
8. What are the possible incentives that could arise from interaction within the company?

Please tick as many as appropriate

a. Open culture and encouraging attitude within the company
b. Strategic choice of the company
c. Big company with more resources
d. Small company with more flexibility
e. Short term strategy focus: to be flexible
f. Long term strategy focus: benefit in the long term
g. Effective risk management and control system
h. Appropriate preference of the balance of risk and reward
i. To establish and maintain reputation of the company
j. Profit incentive
k. To improve the company’s capacity
l. To develop and enhance the company’s core values
m. High product value forces innovation
n. Low product value encourages innovation

9. Have those situations ever arisen in your company?

Please tick as many as is appropriate

a. Lose core value by diversifying too much
b. Innovate just for the sake of innovation without clear objective
c. Everyone spends more in innovation with no guarantee of more profits
10. What are the barriers to innovation

*Please tick as many as is appropriate*

a. High risk involved
b. Conservative attitude
c. Extra cost
d. Uncertainty
e. Resistance to change
f. Strategic choice of the company
g. Ineffective legal/patent protection
h. Limitation of the company’s capacity

11. I believe cooperation with others in innovation is an effective method to remove the barriers.

Agree ☐ (GO TO Q12) Uncertain ☐ (GO TO Q12) Disagree ☐ (END)

12. What are the reasons for cooperation in innovation?

*Please tick as many as is appropriate*

a. To gain new market access
b. To gain access to resources and expertise of others
c. To reduce the risks and costs involved in the innovation
d. To achieve a win/win situation with the co-operators
e. To adapt to change in the industry
f. To crystallise ideas in the company

*End of the questionnaire*

*Thank you for your participation*