The effect of sunk costs in competency and asset specificity on the outsourcing decision: An experimental study

Abstract

This paper explores whether sunk costs in competency resources make a difference to managers' outsourcing decisions. We first pose two research questions as to (1) whether there is any difference between sunk costs in core competency and non-core competency resources for motivating managers to choose outsourcing and (2) whether asset specificity (customization) interacts with the competency logic in outsourcing decisions. By way of a 2x2 experimental decision case this paper compares the effects of sunk costs in core competency and non-core competency resources variants. The results reveal a significant competency variable, confirming a difference between sunk costs in core competency and non-core competency resources, specifically managers are more likely to outsource activities with sunk investments in non-core competency resources. The results show that there is a significant difference between these two levels of asset-specific investments on the selection of outsourcing, specifically managers are more likely to outsource low asset-specific investments. The results also indicate that there is interaction effect of sunk costs in competency resources and asset specificity on the outsourcing decisions. This paper findings extend the extant sunk cost literature to test the specific circumstances of core and non-core competency resources and use the sunk-cost fallacy to explain the potential reasons behind the current mixed findings in relation to the core competency literature. This paper holds practical implications for firms in the strategic design of outsourcing based on organizational capability considerations rather than opportunism concerns alone.

Keywords Sunk cost, Core competency, Transaction cost economics, Asset specificity, Outsourcing.

1. Introduction

The outsourcing decision has become a critical issue in corporate management since it is used as a strategic device in today's competitive environment. Decision-makers play a critical role in deciding if and when, and to whom, the company should outsource activities. Benefits of outsourcing, such as access to supplier's expertise and economies of scale, enable a company to free up and reallocate its finite resources to other value-added activities (Gewald and Dibbern, 2009) and thus to develop corporate competitive advantage (Gilley and Rasheed, 2000).

A research area in the outsourcing literature is the concept of sunk costs. Any previous investments in current internal production are to be regarded as sunk costs (Roodhooft and Warlop, 1999). Traditional wisdom suggests that sunk costs should not be considered in decision-making. In practice, however, decision makers are often influenced by sunk investments that they make (Roodhooft and Warlop, 1999; Whitten and Wakefield, 2006). Sunk investments are diverse in their attributes. While some investments may constitute resources and competencies that are critical and core to the firms' specialisation, some may not.

Core competency is a strategic factor to consider in make-or-buy decision (Kremic *et al*., 2006). The concept of core competency and its relation to outsourcing has been first introduced in the work of Prahalad and Hamel (1990). According to the authors, core competency can be defined as the set of collective skills, expertise and knowledge gained in relation to the central organisational activities as against allied activities. Hafeez *et al*. (2007) suggest that core competencies are source of competitive advantage and incorporate core competencies into a decision-making model for outsourcing plan. Smith *et al*. (2005) suggest that the more core the function is, the less likely the organization is to outsource it because the core business enables the organisation to create and sustain a competitive advantage. Though theory suggests that sunk investments in core competency resources are less likely to be outsourced, there is little consensus in the empirical literature.

In organisational studies, transaction cost economics (TCE) has remained as a standard framework that is used to investigate the determinants of make-or-buy decisions (Klein, 2005). Asset specificity has become a key attribute under TCE and a critical factor that influences outsourcing decisions (Everaert *et al*., 2010; Kremic *et al*., 2006; Watjatrakul, 2005). Asset specificity represents the level of customization connected with the transaction. Specific assets are tailor-made for the transaction between a particular buyer and supplier with limited or no economic value for other purposes, such that both parties are locked into this trade relationship (Williamson, 1985) and switching to a new relationship is prohibitively costly (John and Weitz, 1988).

This study explores whether sunk costs in competency resources make a difference to managers' outsourcing decisions. The prior literature does not provide clear guidance on how sunk costs in competency resources affect this type of choices of managers. We first pose two research questions as to (1) whether there is any difference between sunk costs in core competency and non-core competency resources for motivating managers to choose outsourcing and (2) whether asset specificity (customization) interacts with the competency logic in outsourcing decisions.

We examine our research questions by a 2 (sunk costs in competency resources) x 2 (asset specificity) between-subjects experimental design. The participants were told to assume a production manager's role in Mountain Bicycle Limited (MBL), a hypothetical company that designs and produces mountain bicycles for its own brand. The participant's role is to evaluate whether to outsource production function relating to the mountain bikes or keep it internal within the organisation. The first independent variable is the sunk costs in competency resources, which can be either core or non-core competency resources. The second variable is asset specificity, which can be either high or low level. For the dependent variable 'likelihood

of outsourcing the production of the components of the mountain bike', the participants are provided with a 7-Likert scale to answer those questions.

Using Qualtrics to administer the experimental instrument (see Appendix for extracts of the instrument) and to recruit study participants and after relevant screening, we obtained a final total sample of 105 participants with relevant supply chain knowledge. The participants were randomly assigned to each of the four treatment groups.

The results of our experiment provide some useful insights for strategic design of outsourcing decisions within firms. We find that the managers are more likely to outsource activities with sunk investments in non-core competency resources and that the managers are more likely to outsource low asset-specific investments. We also find that there is interaction effect of sunk costs in competency resources and asset specificity on the outsourcing decisions. When firms involved in high asset-specific investment transaction, their managers are less likely to outsource activities with sunk investments in non-core competency resources.

The remainder of the paper is as follows. Section 2 reviews the theory and literature. Sections 3 develops the hypotheses. Section 4 explains the research method and reports the results for the experiment. Section 5 concludes with a discussion of key findings and avenues for future research.

2. Theory and literature review

2.1 Sunk costs and core competency

2.1.1 Sunk costs

Either current or future decision does not change sunk costs and therefore these costs should not be considered in decision-making (Friedman *et al*., 2007). Any previous investments in a current internal production are to be regarded as sunk costs (Roodhooft and Warlop, 1999). For example, expenditures on developing R&D activities, such as purchase of physical-specific assets, recruitment and training of specialized staff, and information collection on new

technologies, are considered as sunk costs (Manez *et al*., 2009). These start-up investments made to promote R&D activities become irrecoverable. Roodhooft and Warlop (1999) find an influence of sunk costs in outsourcing decision and demonstrate that managers do take sunk costs into account in the outsourcing decision. Jabbour (2013) suggests that sunk costs are associated with outsourcing decision because these costs involve finding a suitable supplier, writing contracts, monitoring and controlling the supplier's corresponding production, and exchanging knowledge and technology with the supplier.

2.1.2 Core competency

Core competencies can be defined as the set of collective skills, expertise and knowledge gained in relation to the central organisational activities as against allied activities. Asatiani *et al*. (2019) identify a positive relationship between a focus on core competency and level of outsourcing. Smith *et al*. (2005) acknowledge that outsourcing is motivated by a clear focus on the organisation's core business, which enables the organisation to create and sustain a competitive advantage. Jiang *et al*. (2007) point out that outsourcing core business-related functions enhances firms' market value because a direct relationship between firm's core competencies and firm's core business makes the position of the outsourced business process in the whole value chain relatively visible for shareholders based on technological capabilities. Viswanathan *et al*. (2021) find that core-component outsourcing financially benefit companies in terms of production cost reductions because fix costs on plant and equipment are saved and marginal cost of production is reduced.

2.2 Transaction costs and asset specificity

2.2.1 Transaction costs

Transaction cost economics (TCE) has remained as a standard framework that is used to investigate the determinants of make-or-buy decisions (Klein, 2005). Transaction costs consist of the costs of executing the buy decision, including the ex-ante costs of negotiating a contract and the ex-post costs of monitoring supplier's performance (Williamson, 1985). Transaction cost theory relies on two psychological assumptions: bounded rationality and opportunism (Williamson, 1985). Where many suppliers exist in a competitive market, a company tends to entrust activities to external parties. In such circumstances, supplier's behaviour is monitored by market pressures (Hennart, 1989). When the power of markets fails and the number of potential suppliers available to a company is limited, a supplier may behave opportunistically. Setting stringent requirements in negotiations and extensively supervising contractual relationships can hinder this tendency for opportunistic behaviour thereby inevitably increasing transaction costs (Dwyer and Oh, 1988). In such a situation, replacing outside suppliers with in-house personnel can significantly reduce the transaction costs as the company can more effectively monitor and control these internal employees' behaviour (Hennart, 1989). According to TCE, though there are three determinants of outsourcing: asset specificity, uncertainty and transaction frequency, asset specificity is ranked as the most crucial since the presence of specific assets can result in market failure (Williamson, 1985).

2.2.2 Asset specificity

Asset specificity represents the level of customization connected with the transaction. Investments made with a degree of asset specificity refer to costs that have limited or no economic value outside the buyer-supplier transaction. When investing in these dedicated assets, a buyer and a supplier are locked into this transaction, because this asset is tailor-made for the transaction and cannot be used for other purpose (Williamson, 1985). Switching to a new

relationship is prohibitively expensive due to asset specificity (John and Weitz, 1988). The empirical literature finds that asset specificity is a critical factor that influences outsourcing decisions and suggest that the greater the asset specificity is, the less likely it is to be outsourced (Everaert *et al*., 2010; Kremic *et al*., 2006; Watjatrakul, 2005). Leiblein and Miller (2003) find that asset specificity increases the risk of transaction, so the likelihood to outsource activities is low. Everaert *et al*. (2010) find that higher asset specificity is associated with lower levels of outsourcing as specific tasks require more know-how and become costly to be carried out by external providers. De Vita and Tekaya's (2015) argue that outsourcing under high asset specificity can detract from a hotel's effectiveness and seriously damage its reputation.

3. Hypotheses development

Viswanathan *et al*. (2021) suggest that outsourcing core-competence activities takes place at the risk of losing opportunities to improve internal innovation capabilities because identification and evaluation of innovation within the company can be diluted. Arms-length monitoring makes outsourcing of core portions costly in a long-term transaction. Quinn (1999) suggests that a company must not contract its core competences out. Instead, the client company can remain core competence under corporate control by subcontracting non-core parts to outside suppliers (Premuroso *et al*., 2012). Dekkers (2000) points out that companies should concentrate on core competencies to react to the competitive environment. Core competencies are a set of abilities with which organizations are the leader in the business world, thereby delivering high value to their customers. These core competencies differentiate the company among competitors and enable it to outperform in the competitive market. Core competencies are physically embodied in end products known as core products (Prahalad and Hamel, 1990), and provide companies opportunities to create new products, which are inimitable for competitors and distinctive in marketplace (Hafeez *et al*., 2002). Internal production of these products has direct impacts on product performance (Zirpoli and Becker, 2011), including

revenue generation and an increase in market share, thereby contributing to the improvement of overall corporate performance (Gottfredson *et al*., 2005). Therefore, core-competence activities are likely to be retained in-house. Hence, we propose the following hypotheses:

H1: Managers are more likely to outsource activities with sunk investments in *non-core competency* resources as against core competency resources.

The core proposition of TCE predicts that under conditions of high asset specificity in the buy-seller relationship, the transactional costs necessary to safeguard against the suppliers' opportunistic behaviour are costly. Buying companies involved in activities with transaction-specific investments tend to heavily rely on suppliers, and these suppliers opportunistically increase service price or provide inferior service by the threat of termination of the contract (Lonsdale, 2001). Consequently, the suppliers' opportunistic behaviour negatively affects performance of these buying companies. Under the circumstances, the transaction cost of necessarily protecting the existing relationship or switching to a new buyer-supplier relationship becomes higher for the outsourcers (Dabhilkar, 2011). However, a company is capable of measuring and rewarding behaviour within the company, thereby reducing transactional costs associated with specialized asset investments (Eisenhardt, 1989). Hence, with the presence of asset specificity, firms favour in-house production (Everaert *et al*., 2010; De Vita and Tekaya, 2015). We thus hypothesize the following:

H2a: Managers are more likely to outsource *low asset-specific investments* as against high asset-specific investments.

H2b: In high asset-specific investments, managers are less likely to outsource activities with sunk investments in non-core competency resources.

4. Experiment

4.1 Design

We examine our research questions by a 2 (sunk costs in competency resources) x 2 (asset specificity) between-subjects experimental design. The research questions examine (1) whether there is any difference between sunk costs in core competency and non-core competency resources for motivating managers to choose outsourcing decisions and (2) whether asset specificity interacts with the competency logic in outsourcing decisions. The participants were told to assume a production manager's role in Mountain Bicycle Limited (MBL), a hypothetical company that designs and produces mountain bicycles for its own brand. The participant's role is to evaluate whether to outsource production function relating to the mountain bikes or keep it internal within the organisation. In the experiment, the manipulations result in four cells with sunk costs in core competency or non-core competency resources, and high or low level of asset specific transactions. Extracts of the experimental instrument are in the Appendix.

The first independent variable is the sunk costs in competency resources, which can be either core or non-core competency resources. Half the participants are informed that production of a uniquely single-sided front suspension fork is core to MBL's manufacturing capabilities and MBL has invested US$ 5 million in this type of front suspension fork. The other half received that production of a two-sided front suspension fork is secondary (not core) to MBL's key capabilities and MBL has invested US$ 5 million in this type of front suspension fork. The second variable is asset specificity, which can be either high or low level. Half the participants assess a customised frame. The other half evaluate a standard frame. For the dependent variable 'likelihood of outsourcing the production of the components of the mountain bike', the participants are provided with a 7-Likert scale to answer those questions.

4.2 Participants

We used Qualtrics to administer the experimental instrument (see Appendix for extracts of the instrument) and to recruit study participants. Qualtrics distributed the experimental materials to participants, and they were randomly assigned to one of the four experimental treatment groups.

A total of 105 US-based managers participated in this experiment. We required that participants have a minimum of two-year work experience in purchasing or supply chain management. Since the study deals with decision making in supply chain context, we added two specific screening questions (which would close the survey if the answers were incorrect) as an objective assessment of their supply chain knowledge before they could commence the experiment. The above questions gave us some comfort that the groups had an appropriate level of competency and experience to complete the task. We wanted participants to have a reasonable level of experience so they could appropriately complete the task (Libby *et al*., 2002). The participants have an average of 23.6 years of full-time working experience and 10.2 year of purchasing or supply chain management experience.

In terms of further information on these participants, 55.2 percent have a Bachelor degree and 23.8 percent have a Masters degree. Though a majority are male participants, there is still a good representation (39 percent) by female participants. A majority of the participants are aged 35 or above (88.6 percent).

4.3 Manipulation and practical checks

Checks were undertaken to ensure the effectiveness of the manipulated variables. First, the participants were asked to recall whether "the front suspension fork in MBL was central to the organizational capabilities of MBL or not". Second, participants were asked to recall whether "the frame for mountain bikes in MBL was a commonly-used or specialized frame". Further, two scenario practical check questions were asked of the participants to make sure that they

properly understanded the experimental materials. All participants correctly answered manipulation and practical attention checks questions.

4.4 Test of Hypothesis 1 (H1)

H1 predicts that managers are more likely to outsource activities with sunk investments in non-core competency resources as against core competency resources. Table 1, Panel A reports the descriptive information and shows that the managers in the non-core competency condition are more likely to outsource activities on average (M = 5.94) than those in the core competency condition (M = 1.81). The ANOVA in Table 1, Panel B shows that this difference is very significant ($F = 666.761$, $p < 0.001$). These results therefore support H1 in that managers are more likely to outsource activities with sunk investments in non-core competency resources as against core competency resources.

[Insert Table 1 here]

4.5 Test of Hypothesis 2 (H2a)

H2a predicts that managers are more likely to outsource low asset-specific investments as against high asset-specific investments. Table 2, Panel A reports the descriptive information and shows that the managers in the low asset-specific condition are more likely to outsource activities on average (M = 5.74) than those in the high asset-specific condition (M = 2.04). The ANOVA in Table 2, Panel B shows that this difference is very significant ($F = 271.270$, $p < 0.001$). These results therefore support H2a in that managers are more likely to outsource low asset-specific investments as against high asset-specific investments.

[Insert Table 2 here]

4.6 Test of Hypothesis 3 (H2b)

H2b predicts that in high asset-specific investments, managers are less likely to outsource activities with sunk investments in non-core competency resources. Table 3 Panel A reports the descriptive information and shows that the managers in the high asset-specific condition are less likely to outsource activities with sunk investments in non-core competency resources on average (M = 2.50) compared to those in the low asset-specific condition (M = 5.46). Figure 1 shows the interaction effect of sunk costs in competency resources and asset specificity. The ANOVA in Table3, Panel B shows that this difference is very significant (F = 13.371, p < 0.001). These results therefore support H2b in that in high asset-specific investments, managers are less likely to outsource activities with sunk investments in non-core competency resources.

[Insert Table 3 here]

[Insert Figure 1 here]

4.7 Overview of the results

The results of our experiment provide some useful insights for strategic design of outsourcing decisions within firms. We find that the managers are more likely to outsource activities with sunk investments in *non-core competency* resources and that the managers are more likely to outsource low asset-specific investments. We also find that there is interaction effect of sunk costs in competency resources and asset specificity on the outsourcing decisions. When firms involved in high asset-specific investment transaction, their managers are less likely to outsource activities with sunk investments in non-core competency resources.

5. Discussion and Conclusion

The results suggest some important findings relating to how managers are motivated to choose outsourcing decisions. For the managers, there is the likelihood to outsource, and it also may be part of their strategic make-buy decisions. In our experiment, we explore if there is any

difference between sunk costs in core competency and non-core competency resources for motivating managers to choose outsourcing decisions. These are essential natures of corporate resources to influence management behaviour, and we are unaware of research that has examined sunk cost in core and non-core competency resources in the context of supply chain. We manipulate sunk costs in these competency resources and then ask the managers to indicate the likelihood to outsource the production of the components of the mountain bike. In exploring this research question, we find there is difference between these two natures of corporate resources on managers' behaviour. Our first hypothesis predicted that managers are more likely to outsource activities with sunk investments in non-core competency resources as against core competency resources. This expectation is due to the fact that internal production of activities with sunk investments in core competency resources secures the competitive advantage of firms. Our findings confirm that managers are more likely to choose outsourcing decisions when there are activities with sunk investments in non-core competency resources.

We then explore if asset specificity interacts with the competency logic in outsourcing decisions. Our second hypothesis predicts that managers are more likely to outsource low asset-specific investments as against high asset-specific investments. This is due to less risks for low asset-specific transaction compared to high asset-specific transaction which would result in minimization of the transaction costs incurred in buying or producing the product. Our findings confirm that managers are more likely to choose outsourcing decisions when there are activities with low asset-specific investments.

Our third hypothesis examines the interaction effect of sunk costs in competency resources and asset specificity on the outsourcing decisions and our findings confirm that in high asset-specific investments, managers are less likely to outsource activities with sunk investments in non-core competency resources compared to those in the low asset-specific investments. Supporting these expectations, the operational make-buy literature predicts that from a strategic

perspective, firms outsource non-core activities and focus on activities central to their capacities to align with effective allocation of scarce resources. This is because of distinction in the marketplace and competitive advantages. Transaction cost economics literature finds that when investing in buyer-supplier assets, a buyer and a supplier are locked into this transaction, because this asset is tailor-made for the transaction and cannot be used for other purpose (Williamson, 1985). Switching to a new relationship is prohibitively expensive due to asset specificity (John and Weitz, 1988).

Two important contributions of this study are to extend the extant sunk cost literature to test the specific circumstances of core and non-core competency resources and to use the sunk-cost fallacy to explain the potential reasons behind the current mixed findings in relation to the core competency literature. This study also holds practical implications for firms in the strategic design of outsourcing based on organizational capability considerations and opportunism concerns. Interestingly, we find that managers are less likely to outsource activities with sunk investments in non-core competency resources when buying firms are involved in high asset-specific investments compared to those in the low asset-specific investments.

There are a few limitations from our study beyond the standard limitations associated with experimental research. First, this research finds support for the operational make–buy literature that relates to resource-based view of a firm and economic perspective on minimization of costs. Note that the scenario in this experimental research relates only to outsourcing decisions in the manufacturing industry. Therefore, it raises the question: Would the results also conform to outsourcing decisions targeted at service industry?

Second, our study gives participants limited information of the buying company in order to make the task manageable. In the real world, managers from buying firms face other challenges concerning supplier's cost performance, interpersonal trust between the managers and the supplier's sales representative and information source formality. Future research may use more

complex experimental designs by examining the effects of these factors on outsourcing decisions.

Appendix
Excerpts from the Case Materials

EXPERIMENT - ALL CONDITIONS

Mountain Bicycle Limited (MBL)

Background Information

Mountain Bicycle Limited (MBL) is a medium sized mountain bicycle company. MBL designs and produces mountain bicycles for its own brand. MBL provides various types of mountain bikes with different levels of technology to consumers from beginners to professional users. Effective supply chain management can contribute to MBL's competitiveness in the market. MBL had US$ 300 million in sales, US$ 30 million in profits and US$ 200 million in assets last financial year.

EXPERIMENT - FOUR DIFFERENT CONDITIONS

CONDITION 1: Prior Investment in Core Competency and High Asset Specificity

As a product manager, it is your responsibility to evaluate whether to outsource production function relating to the mountain bikes or keep it internal within the organisation. Benefits of outsourcing include cost saving, economies of scale and access to expertise. Benefits of internal production include full internal control, intellectual property protection and faster response times. MBL mountain bikes include two main components: (a) a **front suspension fork** and (b) a **frame**.

(a) Front suspension fork: Production of a uniquely single-sided front suspension fork is **core to MBL's manufacturing capabilities**. In a decision supported by senior management, MBL has invested US$ 5 million in this type of front suspension fork. Mountain bikes with the front suspension fork can make MBL **stay ahead in technological advancements** and provide a **competitive advantage** in the market. It enables a number of **innovations**, including lightweight feel, razor-sharp precision, and smooth travel.

(b) Frame: Mountain bike frame consists of the main body structure (other than the front suspension fork) that is designed and moulded differently to suit different customer requirements. MBL believes that a **customized** mountain bike frame designed for MBL **differentiates** its products in the market.

- Carbon is a **new material** used for MBL mountain bike frame and **different from the material that competitors use**. Full carbon mountain bikes are lightweight, stable and fast.
- Mountain bikes with **customer-specific frame design** can make every rider, from the shortest to tallest, experience the same suspension performance. **Other companies do not apply this rear suspension to their products**.

CONDITION 2: Prior Investment in Non-Core Competency and High Asset Specificity

As a product manager, it is your responsibility to evaluate whether to outsource production function relating to the mountain bikes or keep it internal within the organisation. Benefits of outsourcing include cost saving, economies of scale and access to expertise. Benefits of internal production include full internal control, intellectual property protection and faster response times. MBL mountain bikes include two main components: (a) a **front suspension fork** and (b) a **frame**.

(a) Front suspension fork: Production of a two-sided front suspension fork is **secondary (not core) to MBL's key capabilities**. In a decision supported by senior management, MBL has invested $US 5 million in this type of front suspension fork. Mountain bikes with this front suspension fork has **no particularly distinguishing innovations and features**. It will **not give MBL a notable edge** over its competitors in the market.

(b) Frame: Mountain bike frame consists of the main body structure (other than the front suspension fork) that is designed and moulded differently to suit different customer requirements. MBL believes that a **customized** mountain bike frame designed for MBL **differentiates** its products in the market.

- Carbon is a **new material** used for MBL mountain bike frame and **different from the material that competitors use**. Full carbon mountain bikes are lightweight, stable and fast.
- Mountain bikes with **customer-specific frame design** can make every rider, from the shortest to tallest, experience the same suspension performance. **Other companies do not apply this rear suspension to their products**.

CONDITION 3: Prior Investment in Core Competency and Low Asset Specificity

As a product manager, it is your responsibility to evaluate whether to outsource production function relating to the mountain bikes or keep it internal within the organisation. Benefits of outsourcing include cost saving, economies of scale and access to expertise. Benefits of internal production include full internal control, intellectual property protection and faster response times. MBL mountain bikes include two main components: (a) a **front suspension fork** and (b) a **frame**.

(a) Front suspension fork: Production of a uniquely single-sided front suspension fork is **core to MBL's manufacturing capabilities**. In a decision supported by senior management, MBL has invested US$ 5 million in this type of front suspension fork. Mountain bikes with the front suspension fork can make MBL **stay ahead in technological advancements** and provide a **competitive advantage** in the market. It enables a number of **innovations**, including lightweight feel, razor-sharp precision, and smooth travel.

(b) Frame: Mountain bike frame consists of the main body structure (other than the front suspension fork) that is designed and moulded differently to suit different customer requirements. MBL designs a **standard** frame for its products.

- **Conventional material** is used for MBL mountain bike frame. **Competitors use the same material**.
- Hardtail mountain bikes do not feature a rear suspension. **This design is commonly used in the market**.

CONDITION 4: Prior Investment in Non-Core Competency and Low Asset Specificity

As a product manager, it is your responsibility to evaluate whether to outsource production function relating to the mountain bikes or keep it internal within the organisation. Benefits of outsourcing include cost saving, economies of scale and access to expertise. Benefits of internal production include full internal control, intellectual property protection and faster response times. MBL mountain bikes include two main components: (a) a **front suspension fork** and (b) a **frame**.

(a) Front suspension fork: Production of a two-sided front suspension fork is **secondary (not core) to MBL's key capabilities**. In a decision supported by senior management, MBL has invested $US 5 million in this type of front suspension fork. Mountain bikes with this front suspension fork has **no particularly distinguishing innovations and features**. It will **not give MBL a notable edge** over its competitors in the market.

(b) Frame: Mountain bike frame consists of the main body structure (other than the front suspension fork) that is designed and moulded differently to suit different customer requirements. MBL designs a **standard** frame for its products.

- **Conventional material** is used for MBL mountain bike frame. **Competitors use the same material**.
- Hardtail mountain bikes do not feature a rear suspension. **This design is commonly used in the market**.

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Table 1: Descriptive statistics and ANOVA for Likelihood of Outsourcing

Panel A: Descriptive Statistics for Likelihood of Outsourcing[a]

	Sunk Costs in Core competency	Sunk Costs in Non-core competency	Row means
High Asset Specificity	1.96[b] [0.82] (n = 26)	6.14 [0.83] (n = 22)	3.87 [2.26] (n = 48)
Low Asset Specificity	1.68 [0.65] (n = 31)	5.77 [0.95] (n = 26)	3.54 [2.20] (n = 57)
Column Means	1.81 [0.74] (n = 57)	5.94 [0.91] (n = 48)	3.70 [2.22] (n = 105)

Panel B: ANOVA

Factor	**SS**	**df**	**Mean Square**	**F**	**p-value**
Type of Competency	441.924	1	441.924	666.761	0.000
Level of Asset Specificity	2.743	1	2.743	4.138	0.045
Type of Competency × Level of Asset Specificity	0.045	1	0.045	0.067	0.796
Error	66.942	101	0.663		

[a] Likelihood of outsourcing are measured by participants' responses to the likelihood of outsourcing the production of the suspension fork of the mountain bike. The participants are provided with a 7-Likert scale to answer the question.
[b] Cells contain mean [standard deviation] and (number of observations).

Table 2: Descriptive statistics and ANOVA for Likelihood of Outsourcing

Panel A: Descriptive Statistics for Likelihood of Outsourcing[a]

	Sunk Costs in Core competency	Sunk Costs in Non-core competency	Row means
High Asset Specificity	2.46[b] [1.42] (n = 26)	1.55 [1.14] (n = 22)	2.04 [1.37] (n = 48)
Low Asset Specificity	5.90 [1.04] (n = 31)	5.54 [0.95] (n = 26)	5.74 [1.01] (n = 57)
Column Means	4.33 [2.12] (n = 57)	3.71 [2.26] (n = 48)	4.05 [2.19] (n = 105)

Panel B: ANOVA

Factor	**SS**	**df**	**Mean Square**	**F**	**p-value**
Type of Competency	10.609	1	10.609	8.051	0.005
Level of Asset Specificity	357.451	1	357.451	271.270	0.000
Type of Competency × Level of Asset Specificity	1.966	1	1.966	1.492	0.225
Error	133.087	101	1.318		

[a] Likelihood of outsourcing are measured by participants' responses to the likelihood of outsourcing the production of the frame of the mountain bike. The participants are provided with a 7-Likert scale to answer the question.
[b] Cells contain mean [standard deviation] and (number of observations).

Table 3: Descriptive statistics and ANOVA for Likelihood of Outsourcing

Panel A: Descriptive Statistics for Likelihood of Outsourcing[a]

	Sunk Costs in Core competency	Sunk Costs in Non-core competency	Row means
High Asset Specificity	1.85[b] [0.88] (n = 26)	2.50 [1.74] (n = 22)	2.15 [1.37] (n = 48)
Low Asset Specificity	2.94 [1.32] (n = 31)	5.46 [1.21] (n = 26)	4.09 [1.79] (n = 57)
Column Means	2.44 [1.25] (n = 57)	4.10 [2.09] (n = 48)	3.20 [1.87] (n = 105)

Panel B: ANOVA

Factor	**SS**	**df**	**Mean Square**	**F**	**p-value**
Type of Competency	65.391	1	65.391	38.574	0.000
Level of Asset Specificity	106.117	1	106.117	62.598	0.000
Type of Competency × Level of Asset Specificity	22.667	1	22.667	13.371	0.000
Error	171.217	101	1.695		

[a] Likelihood of outsourcing are measured by participants' responses to the likelihood of outsourcing the production of both suspension fork and frame simultaneously of the mountain bike. The participants are provided with a 7-Likert scale to answer the question.
[b] Cells contain mean [standard deviation] and (number of observations).

Figure 1: Interaction Effect of Competency and Asset Specificity on Outsourcing Decisions