Variability: The effects of variation in power relations within the firm, in its market performance, and in the evaluations of its products

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"Variability is the law of life, and as no two faces are the same, so no two bodies are alike, and no two individuals react alike and behave alike."

— William Osler

1. Introduction

Variability is defined as the "...indication of how dispersed the probability distribution is about its center...[or] how spread out on the average are the values of the variable" (Rice, 2007: 130). Variability is a very important term in marketing and management research considering that the main purpose of analytical methods such as the analysis of covariance and correlations, the analysis of variance, and regressions is to provide evidence that the variability of a dependent variable can be significantly explained by a set of other (independent) variables (Rice, 2007). These methods are used as the basis to quantitatively confirm the hypotheses argued in business research, applicable in every facet of business decision making (Hair et al., 2006).

Although the main goal of the previously mentioned analyses is to find factors that can significantly explain the variability of a *dependent* variable, research in management strategy and marketing seems to overlook the potential use of variability as an alternative method to measure the *independent* variables. Several examples of the implementation of this measure method include the lack of consensus across consumer and expert evaluations, the trend of market performance, and the variability of organizational strategy across time, among others. Research that involves the effects of variability is more prominent in the financial literature, where the variability of a stock price is often used to predict its future performance (c.f. Das et al., 2005). Das and Chen (2007) brought their (2005) research into Management Science where, in the latter publication, they discuss how variability of opinions

among stockbrokers regarding a stock can negatively affect sentiment towards the stock which in turn affects its future price.

Apart from Das and Chen (2007), there are only few other studies in the marketing and management literature that examine the effects of variability. One example is Dacin and Smith's (1994) quantitative investigation of consumer behavior with regard to brand extensions. Their research includes a test that confirms a negative effect of varying quality across products within a brand on consumer evaluations of the extension of that brand. However, the first study picking up where Dacin and Smith (1994) left off was Volckner and Sattler's (2006) experimental research that synthesizes various studies about the determinants of product extensions. One significant determinant they find is variability of quality previously suggested by Dacin and Smith (1994). More recently, in Sun's (2012) research, the effects of variability rose in prominence in management and marketing research.

Another important example that gives explicit attention to the effect of variability is the qualitative research by Davis and Eisenhardt (2011). This work concerns the effects of rotating leadership on innovative performance. Davis and Eisenhardt (2011) argue that by varying the leadership, organizations are exposed to a wider perspective and richer knowledge which leads to better performance. In this thesis, their insights about the positive effects of changes in leadership leading to an increase in dynamic capabilities on innovative performance are applied to the study of the dynamics of power and influence across the marketing/R&D interface. Earlier studies on the characteristics of this interface and the consequences for innovative performance are focused on the degree of integration between the two sides of the interface (Griffin & Hauser, 1996; Hoopes & Postrel, 1999; Ittner & Larcker, 1997) or on which side has the greatest influence (Atuahene-gima et al., 2005). If the relative strength of the influence of one side seems to benefit innovative performance, any decline of such influence could be considered a threat (e.g. in the case of recent diminishing

marketing influence, see: Verhoef & Leeflang, 2009). However, this is not necessarily so, as seen from the perspective of Davis and Eisenhardt's (2011) research, which suggests that variability of the balance of power and influence within an organization can have beneficial effects on organizational performance, especially with regard to innovation.

All in all, the idea to use variability as an alternative way to measure a determinant is not new (c.f. Dacin & Smith, 1994; Das & Chen, 2007). However, as Sun (2012) and Davis and Eisenhardt (2011) point out, this method has been largely overlooked by the literature. Therefore, the core subject of this study is to explore and discuss how variability in consumer and expert evaluations and sales affects the performance of the organization in regard to sales and evaluations of future products, strategy in terms of the likelihood to explore new markets, and how the changes in Marketing-R&D orientation strategy affect performance. This discussion is presented in two parts: the first part will set forth the external aspect of organization in terms of market performance and evaluatory signals, while the second part analyzes organizational strategy (market exploration and Marketing/R&D orientation).

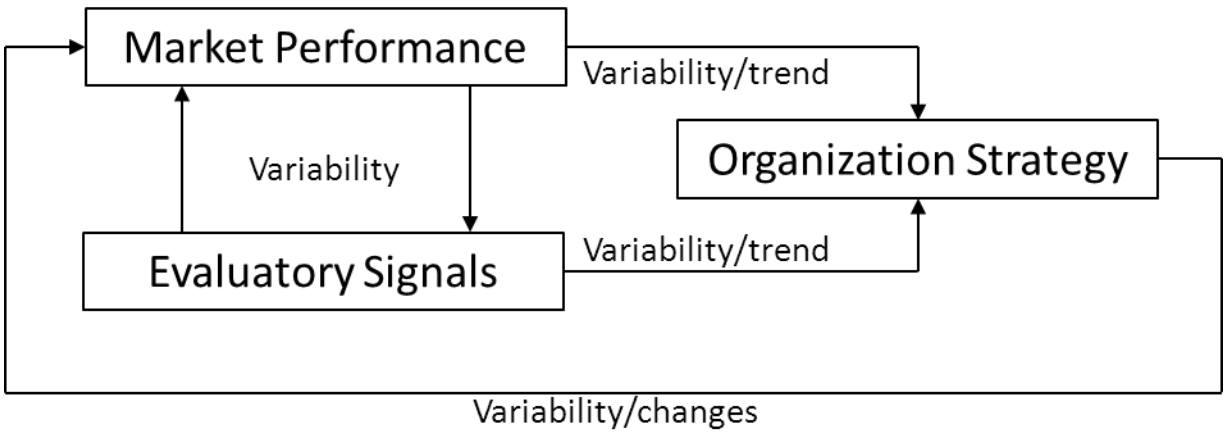

Figure 1.1 Visualization of the conceptual discussion

1.1. Main theoretical themes

Considering the outline of discussion previously described, it is acknowledged that evaluatory signals play a major role and is the first theme of this thesis, particularly how the

variability of evaluatory signals affects attitudes and behaviors of organization stakeholders. The signaling theory is heavily used for this theme. This theory posits that a party or agent *credibly* conveys some information about itself to the principal (Spence, 1973; Kirmani & Rao, 2000; Connelly et al., 2011). For example, in a job market situation discussed by Spence (1973), potential employees send a signal about their personal capability in performing certain tasks by acquiring relevant educational credentials or certifications. In a similar way, signaling is also an important aspect in marketing consumer products, where companies use signals such as expert critic evaluations to convince potential consumers to buy their products (Moon, Bergey, & Iacobucci, 2010). Expert critic is seen here as a credible third party professional evaluator whose main task is to write product evaluations (or reviews) for consumers. Deloitte's (2007) study found that 82% of consumers say that their purchase decisions have been directly influenced by reviews. Particularly in the creative industry where product qualities are difficult to ascertain before consumption (Caves, 2000), evaluatory signals help the consumer to set up expectations and identify product attributes before deciding to buy. It is not surprising that expert evaluations (Basuroy, Chatterjee, & Ravid, 2003; Boatwright, Basuroy, & Kamakura, 2007; Eliashberg & Shugan, 1997; Reddy, Swaminathan, & Motley 1998) can greatly influence product sales. In addition to expert critics, consumers are also able to submit product evaluations via online aggregators such as metacritic.com or imdb.com. Similar to expert evaluations, consumer evaluations also have a significant effect to market performance (Liu, 2006; Zhu & Zhang, 2010).

However, the prior studies largely disregarded that these evaluatory signals can vary and thus the majority of research merely focus on the average signal score, excluding variablity as a pertinent factor (see Sun, 2012). However, recently, Sun (2012) demonstrates how the variability of evaluatory signals is an important attribute that can influence product sales. As pointed out by Sun (2012:696), "...prior research has focused on establishing the

causal impact of the average rating on sales, and little is known about how the rating distribution would matter." This thesis answers Sun's call for more research on this topic. The term signal amplifier will be used when showing how the lack of consensus across signals of the same type moderates the link between the evaluations of past and future products.

The second theme of this thesis is the feedback effects of market performance (sales) on organization strategy and stakeholder attitudes. Past performance is often employed as a main indicator of future organization strategy (e.g. Audia & Greve, 2010; Lehman & Hahn, 2012) and the success of future product (e.g. Hennig-Thurau et al., 2009). The consensus in the literature is that when the market performance of a product or a brand is good, it will be very likely that the market performance of an entity that extends the product or the brand will also be good (Hennig-Thurau et al., 2009).

The analysis in the literature are focused towards examining the relationship between the performance of a product and the sequel, extension, or product upgrade that immediately come after the focal product. What is yet overlooked by the literature is the history of the whole brand/series performance and consequently, therefore, it misses out the opportunity to explore the impact of factors such as market performance fluctuations or trends to the organization. The discussion in this thesis shows how performance variability of an organization affects its future market performance, its product evaluations, and its strategy. In contrast to the prior studies (e.g. Hennig-Thurau et al., 2009), studies in the thesis examines a longer timeframe which will enable observation of the variability of performance and analyze any significant increase or decrease movement of market performance across time, as well as the implications to the organization.

The third theme of this thesis is that of the relative influence of Marketing and R&D departments in new product development. At present, the literature of marketing and product innovation management is focused on the level of influence (Atuahene-Gima & Evangelista,

2000; Verhoef & Leeflang, 2009) rather than on the continuous exchanges of influence (Davis & Eisenhardt, 2011). According to some, a more influential marketing department is generally beneficial because a marketing department's influence is related to a stronger marketing orientation (see also Homburg, Workman & Krohmer, 1999). On the other hand the advocates of R&D would argue that more R&D influence would benefit the technological sophistication of new products. As members of a technological community, R&D professionals have preferences towards technological achievements or scientific recognition (Dietz & Bozeman, 2005), which would in turn be good for the company to gain recognition as an industry leader and advance its portfolio of technological innovations.

Instead of debating which functional area should be more influential, this paper posits that the distribution of relative influence may change in certain directions as organizations evolve and and environments change. For example, earlier it was noted that organizations explore a new sub-market when experiencing a decline or an uncertain performance (c.f. March, 1991) which indicates that a single strategy would not work in favor of the organizations all the time in all conditions. Along the same lines, Davis and Eisenhardt (2011) use the term 'rotating' leadership, which occurs when the leadership in a bilateral partnership is rotated between actors. Davis and Eisenhardt (2011) not only argue that stability in leadership is less productive than relationships that experience rotating influence, but also that consecutive changes, where one party becomes more dominant over time, are also less productive. Their insight is used to explore how variability of leadership in terms of continuous change of the level of influence across time can create a dynamic capability which significantly impacts New Product Performance.

1.2. An overview of the chapters

This thesis is a collection of four studies, all of which have been carried out in close collaboration with PhD co-supervisors Nachoem Wijnberg and Mark Leenders, while the

third study also involved former master thesis supervisor, Gerda Gemser. This thesis is structured as follows. In the first two chapters after the introduction, the focus is on consumers and experts and the role of variability of evaluatory signals on consumer and expert behaviors and attitudes. It then continues by focusing on the organization itself, determining the effect of performance and evaluatory signal variability to their market targeting strategy, and lastly, an exploration of how the variability of relative influence of Marketing and R&D can benefit organizations.

Chapter 2 focuses on the determinants of consumer behaviors in terms of sequel sales with respect to the themes of evaluator signal and performance feedback. In this research, signaling theory is used to elucidate how product evaluations are considered as signals that affect consumer-buying behavior. In so doing, the Hennig-Thurau, Houston, & Heitjans (2009) argument is adopted to set a basic expectation that the evaluations of the previous editions are positively related to the sales of the next edition, which is termed as "the forward carry over effect of evaluations". Market performance of past products also plays a major role here and also determines future market performance. What is new here to the literature is the role of variability. Thus, the task is to theorize and to quantitatively investigate the moderating role of variability of product evaluations across past products to the forward carry over effect of evaluator signals, which will result in adopting the theory of reasoned action (Fishbein & Ajzen, 1975; Miller, 2005). This will position the variability of evaluations as a weighing factor that influence how evaluations of past editions are used by consumers. In addition to variability, other weighing factors are also explored, namely the market performance and the type of product consumption.

Chapter 3 focuses on product evaluations rather than sales. Again in this chapter, evaluator signal and performance feedback are the main topics of discussion. Signaling theory will be employed to show how past performance indicators can be used to predict

expert and consumer evaluations of sequels. The basic expectation would be the evaluations of the preceding editions will be positively related to the evaluations of the sequels, in both the context of consumer evaluations and expert evaluations. However, the variability of attitude across the evaluators reflects a lack of consensus about product quality. Therefore, this chapter will explore how the absence of consensus is damaging for future product evaluations. The absence of consensus also moderates the link between evaluation of past products and sequel evaluation. In addition, sales performance of the previous editions can also positively affect sequel evaluation and lack of consensus is shown to moderate this factor.

Chapter 4 explores how evaluator signals and market performance can be used to predict the probability of video games developers extending their operation to a new genre. Performance feedback is the main theme of this chapter. This study is based on March (1991) and Singh (1986) arguments on the impact of performance on organization risk taking behavior. However, different from other studies, the focus is on variability, in terms of trend and variance of sales and evaluatory signals. The framework is based on the Raisch and Birkinshaw (2008) model on organization explorative and exploitative behaviors. The model here is altered by using variability of performance and evaluator signals as the determinants of behavior rather than organizational antecedents. Following their model, competition is used as the moderating factor of the main determinants.

After discussing the impact of performance and evalutory signals variability to organization strategies, an exploration of how changes of organizational strategy, in terms of the levels of marketing and R&D's relative influence affect new product performance is will be conducted. Chapter then explores how the changes of marketing and R&D's influence in NPD affect the performance of new product. This study fits to the relative influence theme. The main arguments in this part are heavily based on Davis and Eisenhardt's (2011) view on

rotating leadership, and will show how companies can suffer from integration trap if they disregard making changes in the relationships between marketing and R&D across time.

All in all, the relationships between the chapters in this thesis can be visualized on Figure 1.2.

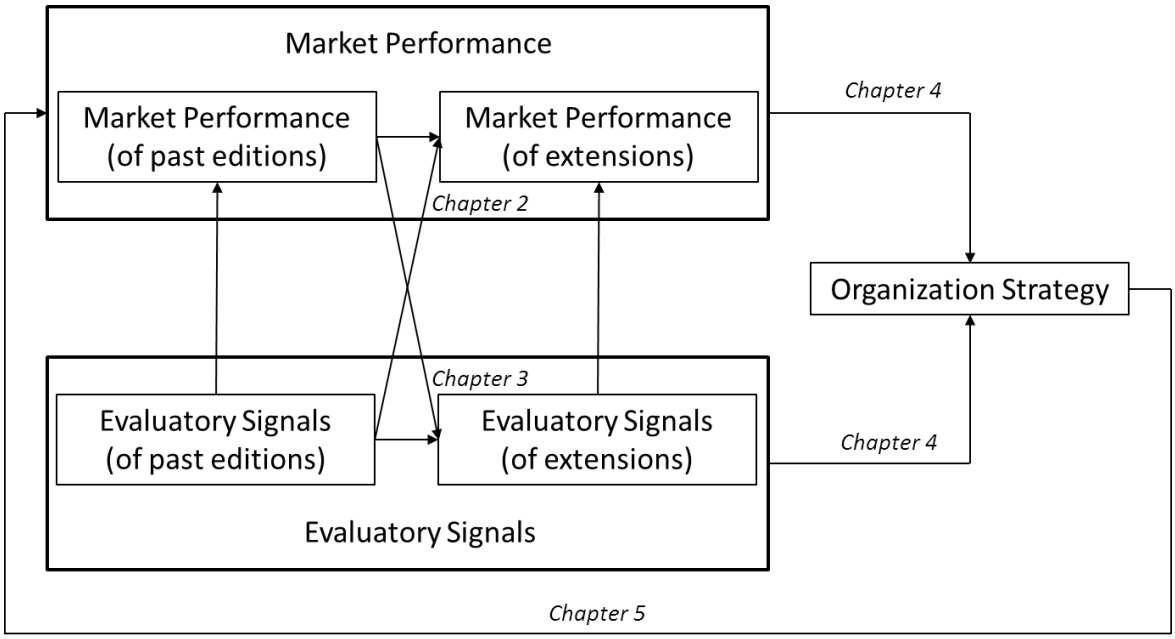

Figure 1.2 Visualization of the links between the chapters

1.3. Methodology

1.3.1. Industrial setting

The studies conducted in this thesis are based on two industries:: the console video games industry (Chapters 1 through 4), and the pharmaceutical industry (Chapter 5). Although the main characteristics of these industries are of the creative and high tech industries, the conclusions derived from the research conducted for this thesis can be extended to different industries, such as the art industry or the automotive industry and others.

The decision to focus on the pharmaceutical industry in Chapter 5 is due to the fact that the structure of the video games industry does not allow observing differences of relative

influence within one company. In the video games industry, the R&D tasks are mainly conducted by video game developers who develop, exploit, and explore new technologies of video gaming production (Kerr, 2006). Activities traditionally performed by a marketing department are mainly conducted by video game publishers (Kerr, 2006). Therefore, in collecting the data on the relative influence from the video games industry, questionnaires would have to be sent to both video game developers and publishers, which would complicate the process and double the time spent for data collection. As video game developers can also have contracts with different publishers, the data gathering process is even more complicated, as tracking would be necessary. Different from the video games industry, pharmaceutical companies are active in both marketing and R&D activities, which eliminates the previously mentioned complications of using multiple sources and tracking. Nevertheless, the analysis results from the pharmaceutical industry can also be applied to the video games industry (or any other industry with similar traits) in a way that an interdepartmental relationship (marketing and R&D) is replaced by an inter-organizational (i.e. R&D company – marketing company) relationship.

1.3.2. Data gathering

In focusing on two industries, the data are gathered in two ways. Data about the video games industry are gathered via the web crawling method. During the research phase, the team employed a professional programmer to construct software that crawls for data from Metacritic.com. The data are comprised of product evaluation scores, user data (those who submit the evaluation), and the evaluation texts both for experts and consumers who are registered on the website. Following this, market performance data was also gathered from vgchartz.com which records sales data for all games in all platforms in three main markets, i.e. the USA, Europe, and Japan. As of today the software maintains more than 6,000 unique

records in the database which can be used in a broad range of research; a few of them are reported in this thesis.

The pharmaceutical industry data are based on secondary data that are also used in several other studies conducted by prof. Mark Leenders (c.f. Leenders & Wieringa, 2008; Gemser & Leenders, 2011). This database is based on ESOMAR pharmaceuticals industry data focusing on high revenue companies (above $50 million).

1.3.3. Method of analysis

Studies in this thesis are all based on the quantitative research method. Multiple regression analysis and its derivatives are employed in these studies because they are the methods of choice to estimate the relationships between several factors and a dependent variable (Hair et al., 2007). Ordinary Least Square (OLS) tests are implemented to estimate the sales of video game sequels based on the sales performance of preceding product editions, consumer and expert evaluations, social consumption type, and the variability of evaluations. Next, path modeling analysis is employed to estimate the determinants of expert and consumer evaluations. Path modeling is used to estimate both constructs simultaneously. Similar to the previous model, sales performance of preceding product editions, consumer and expert evaluations, and the variability of evaluations are used as the determinants. Logit regression is used to estimate the probability of new market explorations because the output variable is a binary variable which cannot be easily tested using a regular regression (Hair et al., 2007). Lastly, the multiple regression method is employed again to estimate New Product Performance based on the changes in the level of influence of the marketing department and the R&D department during an NPD process.