

# Impact of relationship value on project portfolio success — Investigating the moderating effects of portfolio characteristics and external turbulence

Martin Voss<sup>\*</sup>, Alexander Kock

*Technische Universität Berlin, Chair for Technology, Innovation Management, Strasse des 17. Juni 135, Sekr. H 71, 10623 Berlin, Germany*

Received 6 July 2012; received in revised form 5 November 2012; accepted 8 November 2012

---

## Abstract

Companies today need project portfolio management (PPM) to cope with the increasing number of projects and use it to ensure comprehensive management, strategic alignment, and efficient use of resources. Moreover, customers are demanding more value from their suppliers. The management of a project portfolio and the corresponding customer relationship portfolio implies a link between PPM and relationship management. By combining the fields of PPM and marketing, this study hypothesizes a connection between relationship value and project portfolio success. Because both parties need to extract value from a relationship, relationship value is divided into relationship value for the customer and relationship value from the customer. The results are based on a cross-industry sample of 174 German, Swiss, and Austrian medium-sized and large companies and rely on two informants from each firm. We find a significant relationship between relationship value and project portfolio success as well as moderating effects of portfolio interdependency, portfolio size, and technological turbulence.

© 2012 Elsevier Ltd. APM and IPMA. All rights reserved.

*Keywords:* Project portfolio management; Relationship value; Customer integration; Project portfolio success

---

## 1. Introduction

Today's business activities are increasingly being dominated by projects. Projects are set up to develop and market new products and services, change internal structures or processes, or implement business strategies. Project landscapes are becoming more complex. In addition to effective and efficient single project management, companies require structured and proactive management of the project landscape to stay competitive (Elonen and Artto, 2003). Project portfolio management (PPM) aims to complete a combination of projects under the sponsorship of a particular organization in which the projects share scarce resources (Archer and Ghasemzadeh, 1999; Jonas et al., 2012). It includes various activities, such as decision making on which projects are to be given priority, which projects are to be added to or abandoned from

the portfolio, and how to allocate resources (Archer and Ghasemzadeh, 2004).

In addition, companies currently face customers who demand high value and value-adding activities such as joint product development, financial or consulting services (Homburg et al., 2002). Companies sharpen their customer focus by introducing concepts such as customer relationship management to generate better relationships with customers and better service (Ernst et al., 2011) to increase value both for the customer and for the company (Boulding et al., 2005). Moreover, the management of customer relationship portfolios is receiving more attention in practice and in research (Homburg et al., 2009; Terho, 2009). However, in relation to the project portfolio of a company, the optimization of individual portfolios does not essentially optimize overall business performance; hence the portfolios need to be aligned (Tikkanen et al., 2007).

The alignment between project portfolios and customer relationship portfolios has not been empirically investigated thus far. There is a missing link between the increasing

---

<sup>\*</sup> Corresponding author. Tel.: +49 30 314 26090.

E-mail address: [martin.voss@tim.tu-berlin.de](mailto:martin.voss@tim.tu-berlin.de) (M. Voss).

importance of PPM and the growing importance of the customer (Voss, 2012). Customers are implicitly reflected in the objectives of single projects because their results should satisfy customer needs. The question of the role that customers should play in a project portfolio setting has not yet been examined. PPM can be understood as the hub of an intra-company system that connects projects and operations (Levine, 2005). Which other company functions should be included in PPM and how? Tikkanen et al. (2007) call for a combination of relationship management and project management approaches. How can customer relationship portfolios be linked to project portfolios? How can PPM as a hub be connected to the customer?

The present study addresses these questions by investigating the link between relationship management and PPM. The customers related to a project portfolio form a customer portfolio. We develop a measure to identify the relationship value of a project portfolio and empirically analyze whether this measure is related to project portfolio success. Interactions between marketing and PPM measures would demonstrate the connection between these two fields and emphasize its importance.

Based on literature from both the marketing and PPM domains, our study links the concept of relationship value, which includes both relationship value for the customer (Menon et al., 2005; Ulaga and Eggert, 2006) as well from the customer to the company (Lindgreen and Wynstra, 2005; Walter and Ritter, 2003), with project portfolio success (Jonas et al., 2012; Martinsuo and Lehtonen, 2007; Meskendahl, 2010). We further enhance the rapidly growing body of knowledge in the PPM field. For the first time, we combine the PPM and marketing approaches in an empirical study to investigate a cross-functional perspective on PPM. The study also further develops the marketing research by linking customer relationship portfolios to PPM. We also test interaction and moderation effects as implied by the contingency theory. Our study offers practitioners useful starting points from which to improve the link between customer portfolios and PPM. Consequently, we answer the following research questions:

1. What are the relevant aspects of relationship value?
2. Is there an empirical connection between relationship value and project portfolio success?
3. Which factors influence the strength of the relationship?

In the next section, we provide a theoretical background on PPM, the measurement of its success, the management of a customer portfolio, and the concept of relationship value. The model presented in the subsequent section hypothesizes the influence of relationship value on project portfolio success. Our empirical investigation is based on a cross-industry sample of 174 German, Swiss, and Austrian medium-sized and large firms. We interview two informants in each firm using a standardized questionnaire. After a description of the research setting and employed methods, we present our empirical

results. The study concludes with a discussion of the findings and further avenues of research.

## 2. Theoretical background: project portfolio management and relationship value

### 2.1. Project portfolio management

PPM is receiving increasing attention both in practice and as a field of academic research (Hobbs, 2012; Jonas et al., 2012; Teller et al., 2012). A project portfolio is defined as a set of projects that are executed and managed under the management and sponsorship of a particular organization (Archer and Ghasemzadeh, 1999). A coordinated project portfolio reflects an organization's investment strategy (Dye and Pennypacker, 1999), adds value beyond the results of individually managed projects (Meskendahl, 2010), optimizes available resources and should represent a balance between associated risks and short- and long-term goals (Archer and Ghasemzadeh, 1999; Petit and Hobbs, 2010).

### 2.2. Project portfolio success

Many studies have shown that financial criteria alone are insufficient for a sustainable view of success. Scholars have developed multi-dimensional project-, portfolio-, and company-level concepts (Jonas et al., 2012; Martinsuo and Lehtonen, 2007; Meskendahl, 2010; Voss, 2012) that consider project performance during execution, future preparedness (Shenhar, 2001), alignment of the portfolio to the business strategy, portfolio balance according to the company's resources and capabilities (Cooper et al., 2002) and the use of synergies (Meskendahl, 2010). *Overall business success* incorporates market performance, reflecting the fulfillment of sales objectives and the commercial performance of project results derived from standard financial performance measures (Shenhar et al., 2001). *Average project success* reflects the fulfillment of project performance criteria, such as budget, schedule and quality (Levine, 2005), as well as customer satisfaction (Lechler and Dvir, 2010; Martinsuo and Lehtonen, 2007). *Future preparedness* reflects the preparedness of the organization and its technological infrastructure for future needs (Levine, 2005; Shenhar et al., 2001) and evaluates the long-term benefits and opportunities offered by the projects (e.g., creation of new markets, development of new/improved technologies or processes). Comprehensive management of all projects within a portfolio enables the *use of synergies* by creating additional value beyond managing the projects individually (Meskendahl, 2010). The *strategic fit* of a project portfolio represents the degree to which the project portfolio reflects the company's strategy (Unger et al., 2012). The project management literature states that *portfolio balance*, along numerous dimensions, such as associated risk, project size, balance between short-term and long-term projects (Archer and Ghasemzadeh, 1999), project type, risk level, and resource adequacy (Killen et al., 2008), maximizes the value of the portfolio (Cooper et al., 2002).

### 2.3. Management of a customer portfolio

Every project delivers results for customers, who must be considered in project management regardless of being external or internal. A portfolio of projects consists of numerous projects that serve a group of customers, i.e., a customer portfolio. Thus, PPM must handle a portfolio of customer relationships to deliver project results that satisfy customer needs. Managing a project portfolio corresponds to managing its respective portfolio of customer relationships (Voss, 2012). Relationship marketing describes relationship building and its management as key success factors for companies (Grönroos, 1994). Tikkanen et al. (2007, p. 199) describe the customer relationship portfolio as the main “source of revenues and knowledge that facilitates an understanding of customer value creation and thus developing the company’s offerings”. Different relationships can fulfill different functions for the company (Walter et al., 2001). This is why the research suggests that companies should adapt their relationship management activities according to the relationship’s value for the company. In addition, companies should focus on managing a complete spectrum of relationships, from strategic partnerships to selective transactions (Johnson and Selnes, 2005).

Numerous interdependencies between the customer relationship portfolio and the project portfolio need to be managed (Tikkanen et al., 2007). First, a successful project can further strengthen existing relationships and accelerate the acquisition of new customers. Second, strong customer relationships can help to sell new projects. However, a narrow, short-term perspective on project completion can lead to a negative impact on output quality and, ultimately, customer relationships. A combined optimization between both portfolios is suggested to maximize business performance (Tikkanen et al., 2007).

Management of the customer relationship portfolio is a task of the marketing function,<sup>1</sup> which addresses all customer-related activities, such as identifying the right customers, building customer knowledge, developing customer relationships, and shaping customer perceptions of the company and its offerings (Srivastava et al., 1999). To connect the customer relationship portfolio and the project portfolio, common and interrelated measures must be developed. The concept of value has become central to measuring business exchanges and business relationships.

### 2.4. Value

The key role of functionality or performance is credited to value (Anderson and Narus, 1999). Companies are required to understand the mechanisms and methods of value creation (Wilson, 1995). The value concept has been researched by marketing scholars for the last 30 years because of its conceptual importance, its connections to other key marketing constructs, such as price, quality, or customer satisfaction, and its potential to provide insight into customer behavior (Gallarza et al., 2011).

<sup>1</sup> The term “marketing (function)” incorporates the customer representative function, i.e. depending on the function names given in a company; it can also stand for sales, marketing and sales, or a representative/owner of internal customers.

Basically, value can be considered to be a trade-off between benefits and sacrifices (Barry and Terry, 2008) and it can be defined monetarily and also reflect non-monetary revenues such as market position, competencies, or social rewards (Wilson, 1995).

The assumption that companies will only be successful when they offer more value to customers than their competitors leads to the notion that the marketing research is mainly concerned with value *for* the customer (Anderson, 1995; Ravald and Grönroos, 1996). However, companies do not offer any products or services when they cannot extract any value for themselves *from* that relationship. In addition to simple monetary terms, they can also benefit from product ideas, access to new markets, or other virtues from their customers (Anderson et al., 1994; Wilson, 1995). Thus, a relationship between suppliers and customers must create value for both parties (Boulding et al., 2005; Grönroos and Helle, 2012; Lefaix-Durand et al., 2009; Ritter and Walter, 2012; Voss, 2012). Value creation does not have to apply to single transactions only, but should rather aim to support longer relationships, thereby creating relationship value. In general, relationship value is considered to be an aggregate measure of relationship outcomes (Corsaro and Snehota, 2010; Geiger et al., 2012; Ulaga and Eggert, 2006) and must reflect the characteristics and nature of the interaction process (Corsaro and Snehota, 2010; Edvardsson et al., 2010; Haas et al., 2012).

#### 2.4.1. Relationship value FOR customer

Value can be seen as the ratio of the benefits received to the sacrifices made by customers (Anderson and Narus, 1999; Ulaga and Eggert, 2006). Two research streams discuss value in business-to-business markets: one focuses on the object of transaction, i.e., the product or service, and the other focuses on the relationship, also considering certain offerings beyond the product (Čater and Čater, 2009; Lindgreen and Wynstra, 2005). Relationship marketing proposes that relational business exchanges create more value for the involved parties than single transactions (Gummesson, 2004; Kumar, 1999; Ravald and Grönroos, 1996; Sharma et al., 1999). We will further evaluate relational business exchanges because we do not only focus on single transactions, but on longer-term business relationships.

There is consensus in the marketing research in terms of the different dimensions of sacrifices made by customers, with scholars recognizing purchasing price, acquisition costs, and operations costs as basic sacrifices (Menon et al., 2005; Ulaga and Eggert, 2006). However, they do not agree on the dimensions of received benefits. Menon et al. (2005) disaggregate benefits into core and add-on benefits; core benefits are defined as the required features for a customer to engage in a relationship (Menon et al., 2005). Ulaga and Eggert (2006) identify core offering, sourcing process, and customer operations as benefit dimensions. As in Voss (2012), we follow Ulaga and Eggert’s approach because they allow for the assessment of the important value drivers of supplier value offerings (Lefaix-Durand and Kozak, 2010) and have received higher acceptance in the marketing literature (Barry and Terry, 2008; Čater and Čater, 2009).

### 2.4.2. Relationship value FROM customer

Research on relationship value from the supplier's point of view is not as extensive as that on value for the customer. Relationship value from the customer is usually structured into which functions a customer can fulfill within the relationship, as suggested by Walter et al. (2001). Just as suppliers need to understand how to provide value (Menon et al., 2005), they must also understand how they can create relationship value for themselves (Lindgreen and Wynstra, 2005). The customer functions can be divided into direct and indirect functions. Direct functions have an immediate effect on the supplier, whereas indirect functions have an indirect effect through other relationships (Walter and Ritter, 2003). We will indirectly distinguish between benefits and sacrifices through transfers to specific functions. That is, sacrifices are seen as the weakening of a function to strengthen another function.

The three *direct functions* are profit, volume and the safeguard function. Profit generation is a fundamental requirement for business activities (Walter et al., 2001). The volume function is fulfilled when customers buy high volumes due to price concessions or when they ensure a certain level of capacity utilization for economies of scale (Walter and Ritter, 2003). In the safeguard function, customers serve as insurance against crises or difficult situations (Walter et al., 2001). *Indirect functions* do not have an immediate effect, but they can yield profit in the future, in other relationships or projects (Walter et al., 2001). Technologically advanced customers with high product or process expertise fulfill an innovation function by improving the supplier's future offerings (Gemünden et al., 1992). The market function entails a prestigious customer's referrals and recommendations to establish contact with new potential partners (Walter and Ritter, 2003). Customers acting as external sources of information about market or technological developments fulfill the scout function (Walter and Ritter, 2003). Finally, the access function can facilitate procedures or negotiation through a customer's experience in handling official authorities, trade associations, or banks (Walter et al., 2001). One customer can fulfill more than one function (Lindgreen and Wynstra, 2005), and the functions are dynamic and interdependent (Möller and Törrönen, 2003), both from customer to customer as well as to the same customer over a longer period of time (Anderson et al., 1994).

## 3. Conceptual framework and hypotheses

One of the main objectives of PPM is to “maximize the contribution of projects to the overall welfare and success of the enterprise” (Levine, 2005, p. 22) by maximizing *project portfolio success* (Archer and Ghasemzadeh, 2004; Martinsuo and Lehtonen, 2007). Customers accept and buy the results of projects when the relationship between the partners can create value for them. On the other hand, a company only executes projects if they increase the relationship value for the company itself. Therefore, both dimensions must be considered: relationship value *for* the customers as well as *from* the customers. A higher *relationship value* can be assumed to have a positive impact on project portfolio success, which is the main link in

the research framework presented in Fig. 1. We argue that project portfolio success can be predicted by the amount of relationship value created in the project portfolio. Furthermore, we suggest an interaction between relationship value for and from the customer in their effect on project portfolio success. Finally, we assume a moderation of these effects by portfolio type, portfolio complexity and environmental turbulence. We propose six hypotheses to be tested with this framework. In the following sections, the hypotheses and constructs behind the framework are explained in depth.

### 3.1. Influence of relationship value on portfolio success

Value creation in PPM is receiving increasing attention (Söderholm et al., 2008; Winter and Szczepanek, 2008). More focus is needed on the value that is contributed to organizations through projects and portfolios, which are considered to be value creation processes providing value for customers beyond products (Arto and Wikström, 2005; Skaates et al., 2002). This is a much broader view than the traditional engineering view of projects as temporary productions (Winter and Szczepanek, 2008). However, value also needs to be created for the supplier (Mele, 2011), as seen above. We will subsequently evaluate possible interaction effects of both types of value.

Relationship value *for* the customer will positively affect average project success because an increase in relationship value increases customer satisfaction (Lam et al., 2004). The research has intensively discussed the classification of value and satisfaction, but value is now considered to be an antecedent to satisfaction (Gallarza et al., 2011). The effect in this relationship “moves from perceived quality and perceived price to perceived value to satisfaction to loyalty” (Gallarza et al., 2011, p. 186). Other empirical studies suggest a positive relation of product quality and delivery performance (core offering) with customer satisfaction (Čater and Čater, 2009). In addition, personal interaction (sourcing process) and supplier know-how (customer operations) also have a positive impact on customer satisfaction (Čater and Čater, 2009), as well as the use of synergies between interdependent projects in the portfolio. Satisfied customers are more loyal to the supplier (Flint et al., 2011; Lam et al., 2004) and strengthen long-term dimensions of project portfolio success, such as strategic fit, balance and future preparedness. Moreover, customer loyalty can also provide a feedback loop for customer satisfaction (Gallarza et al., 2011). Increasing the relationship value for strategically prioritized customers also improves a portfolio's strategic fit and balance. Therefore, we hypothesize the following:

**Hypothesis 1.** Relationship value for the customer is positively related to project portfolio success.

Considering relationship value *from* the customer, the direct functions immediately improve economic success, mainly through a customer's profit function. In addition, the volume and safeguard functions ensure portfolio balance and the strategic alignment of portfolio and customer strategies. Safeguarding customers can provide insurance against future

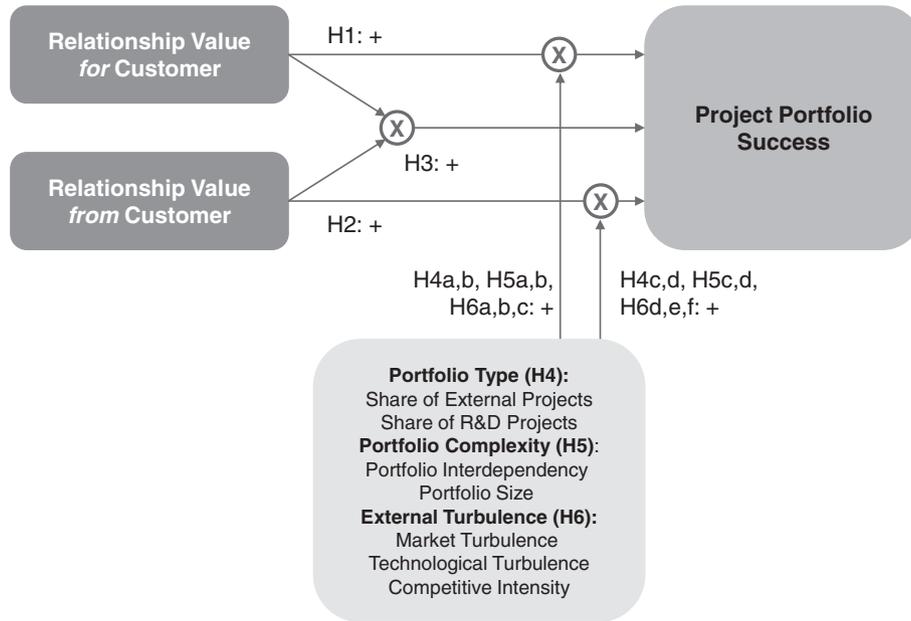


Fig. 1. Framework on the link between relationship value and project portfolio success.

crises and improve portfolio balance and future preparedness. The two dimensions of average project success and use of synergies, however, can be increased through indirect functions. An innovative customer can significantly improve average project success through an innovative contribution. This contribution can provide ideas for new projects or generate synergies by accelerating other projects or improving the functionality for project delivery to other customers. In addition to these technology synergies, a customer can also leverage market synergies through her market function by further driving the company’s business. This effect also improves the strategic fit of the portfolio (depending on the portfolio and customer strategies) as well as directly influencing average project success because the use of market and technology synergies is positively related to project success (Pattikawa et al., 2006). When a project customer collects and disseminates market or technology information, she fulfills the source function and can increase portfolio balance and strategic fit. In addition, these customers provide more access to other important stakeholders or future markets (access function), which, in turn, improve average project success in the future, thereby contributing to future preparedness. These considerations lead us to the following:

**Hypothesis 2.** Relationship value from the customer is positively related to project portfolio success.

The current marketing research stresses the notion that, in a relationship, dimensions of relationship value for both parties should be considered instead of only focusing on a single dimension for one party, thereby promoting the idea of optimizing both to increase performance. We assume that relationship value for the customer and from the customer can support one another and that each may help leverage the effects of

the other. Increased product quality and delivery performance by the supplier leads to a higher relationship value for the customer. The improved service offering, in turn, attracts new customers that better fulfill value functions for the portfolio. These newly attracted customers deliver a higher relationship value from the customer, not only by improving the profit function but also by improving product quality through their innovation function, for example. Newly improved product or service offerings can again attract new customers. This argumentation yields the following:

**Hypothesis 3.** Simultaneous growth in relationship value from the customer and relationship value for the customer is positively related to project portfolio success.

### 3.2. Contingency effects

Project portfolios can differ in numerous dimensions, which can affect portfolio management as well as portfolio performance. The dimensions can be structured into portfolio type, portfolio complexity, and environmental turbulence. We refer to contingency theory and hypothesize interaction effects of moderating elements between the independent constructs and the dependent construct (Donaldson, 2001). The strength of the connection between relationship value and project portfolio success is assumed to depend on the circumstances, related tasks, and environment of the portfolio. A contingency analysis reveals the conditions in which the connection is especially strong as well as which circumstances to concentrate on.

The first contingency factor we investigate are the different types of portfolios; one approach is not appropriate for different types of projects (Shenhar, 2001) and not all portfolios are alike (Teller et al., 2012). We therefore evaluate whether the share of R&D projects and the share of external projects have a moderating impact on the hypothesized relationship. The

second factor addresses portfolio complexity. Inter-project effects in a portfolio can be complex and difficult to anticipate, which makes PPM a multi-dimensional challenge (Killen and Kjaer, 2012). There are various definitions of complexity in the literature (Kim and Wilemon, 2009). Baccarini (1996) defines project complexity through various interdependent elements (tasks) and refers to the number of the elements and their interdependence as dimensions. Tatikonda and Rosenthal (2000) refer to the type, number and size of the subtasks as well as their interdependency as dimensions for complexity. Williams (1999) subsumes dimension number and interdependency as “structural complexity” and adds uncertainty as a dimension. Uncertainty can emerge from different sources, such as technology, the market or the organization, and affects PPM (Petit, 2012). However, technology and market are mainly external drivers of uncertainty, rather than sources from within the organization. Shenhar (2001) defines project complexity as the scope of a system or a hierarchical framework of systems and sub-systems, which can also be disaggregated into the number of elements and their interdependency. In the PPM literature, portfolio complexity usually also includes the number of elements, their degree of interdependency, and the magnitude and predictability of inherent changes (Levinthal and Warglien, 1999), which also reflect uncertainty. We follow the definition of structural complexity in our study because we view uncertainty as driven by external factors, therefore separating it from complexity. In our definition of portfolio complexity, we include portfolio interdependency and portfolio size (Teller et al., 2012). We subsume externally driven uncertainty in the third contingency factor, environmental turbulence.

### 3.2.1. Moderating effects of portfolio type

A portfolio can be described by the types of projects that constitute it. Two main portfolio characteristics are the share of external and R&D projects. The *share of external projects* reflects whether the results of project are intended for external or internal customers. External customers represent business customers or consumers, who usually pay for the products and services and therefore may also have higher requirements. Internal customers can be other teams, departments or business units within the same organization, who may or may not pay for the products or services, depending on internal rules and agreements. Internal projects follow different rules-of-the-game than external client projects (Dammer, 2008). The share of external projects likely leads to different priorities in the combination of relationship value sub-dimensions. Regarding the effect of relationship value on project portfolio success, we assume that the effect will be stronger for projects directed towards external customers because their requirements are more stringent and a company is ultimately more dependent on external customers than internal ones and will therefore put more effort in the creation of value for them. The *share of R&D projects* describes whether there are research and development projects (R&D) or projects that provide results other than new products or technologies. Examples include IT projects that develop new IT systems or software, reorganization projects that change the structure of or processes within a company, or infrastructure

projects. The share of R&D projects might also lead to distorting effects (Dammer, 2008). R&D project portfolios have higher uncertainty and risk, which might affect performance. On the other hand, there is a long tradition of in-depth research on R&D projects; we therefore assume that R&D projects are generally more mature in their management than other types of projects, leading to a stronger effect between relationship value and portfolio success. Consequently, we present the following:

**Hypothesis 4.** Portfolio type has a moderating effect on the relationship between relationship value and project portfolio success. The higher...

**4a.** ...the share of external projects, the stronger the positive effect of relationship value for the customer on project portfolio success.

**4b.** ...the share of R&D projects, the stronger the positive effect of relationship value for the customer on project portfolio success.

**4c.** ...the share of external projects the stronger the positive effect of relationship value from the customer on project portfolio success.

**4d.** ...the share of R&D projects, the stronger the positive effect of relationship value from the customer on project portfolio success.

### 3.2.2. Moderating effects of portfolio complexity

*Portfolio interdependency* describes the interdependency between projects both in terms of scope and content: the extent to which projects are dependent on the results of other projects and need to be aligned with each other. It also includes a time dimension in which project delays directly delay other projects. Higher interdependency might be negatively correlated with success due to the higher complexity of the associated processes (Cusumano and Nobeoka, 1998). Any combination of interdependent projects requires coordinated management activities (Levinthal and Warglien, 1999). The management of interdependencies is still considered to be an area of weakness in PPM (Elonen and Arto, 2003). Increased portfolio interdependency requires more coordination but can also lead to a better use of synergies, e.g., regarding knowledge or between customers. We therefore assume that the creation of relationship value both for the customer and from the customer is even more important for a complex portfolio than for a relatively simple one and that the influence on project portfolio success is even stronger for complex project portfolios.

The other domain, *portfolio size*, represents the number of projects within a portfolio. A high number of projects alone can induce complexity. In addition, portfolio size may affect project portfolio performance because larger portfolios imply larger firms, and larger firms may have more capacity and a greater need to implement PPM. Analogously, we assume that relationship value is more important for a large portfolio than for a relatively small portfolio. In sum, we formulate the following:

**Hypothesis 5.** Portfolio complexity has a moderating effect on the relationship between relationship value and project portfolio success. The higher ...

**5a.** ...portfolio interdependency, the stronger the positive effect of relationship value for the customer on project portfolio success.

**5b.** ...portfolio size, the stronger the positive effect of relationship value for the customer on project portfolio success.

**5c.** ...portfolio interdependency, the stronger the positive effect of relationship value from the customer on project portfolio success.

**5d.** ...portfolio size, the stronger the positive effect of relationship value from the customer on project portfolio success.

### 3.2.3. Moderating effects of environmental turbulence

A project portfolio, like a business organization, is characterized by uncertainty from within the organization. In addition, it faces uncertainties from the external technological and market environment (Danneels and Kleinschmidt, 2001). We argue that environmental turbulence has a significant impact on the environment of a project portfolio. Research on new product development suggests that uncertainty should be used as a moderating variable when assessing performance (Danneels and Kleinschmidt, 2001). Nevertheless, only a few studies investigate the dynamics of project portfolios and their management (Engwall and Jerbrant, 2003). Uncertainty as a contingency factor can also be confirmed by dynamic capabilities theory (Teece, 2007). PPM has been identified as a dynamic capability through the relationship between a company's PPM capabilities and its ability to gain sustainable competitive advantage via new product and service offerings (Killen et al., 2012; Petit, 2012). Teece et al. (1997) define dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (p. 516). Consequently, an organization needs to quickly adjust its resource allocation to adequately adapt to a dynamic environment to achieve a competitive advantage. PPM can be seen as a means to accomplish this task. Thus, we analyze the moderating effects of market and technological turbulence as well as competitive intensity on the relationship between relationship value and project portfolio success and formulate the following:

**Hypothesis 6.** Environmental turbulence has a moderating effect on the relationship between relationship value and project portfolio success. The higher...

**6a.** ...the market turbulence, the stronger the positive effect of relationship value for the customer on project portfolio success.

**6b.** ...the technological turbulence, the stronger the positive effect of relationship value for the customer on project portfolio success.

**6c.** ...the competitive intensity, the stronger the positive effect of relationship value for the customer on project portfolio success.

**6d.** ...the market turbulence, the stronger the positive effect of relationship value from the customer on project portfolio success.

**6e.** ...the technological turbulence, the stronger the positive effect of relationship value from the customer on project portfolio success.

**6f.** ...the competitive intensity, the stronger the positive effect of relationship value from the customer on project portfolio success.

## 4. Methods

### 4.1. Sample

We conducted a cross-industry survey with a sample of German, Swiss, and Austrian medium-sized and large companies to test our hypotheses. The project portfolio of the company or business unit is the object of analysis. We contacted 650 firms via email, providing general information on the study and a solicitation for registration and following up with reminder phone calls. Potential participants were also asked to verify whether an actual portfolio of multiple parallel projects existed and to identify two knowledgeable informants: one informant from senior management (decision maker) and one informant from operative portfolio management (portfolio coordinator). Decision makers usually have decision authority over the project portfolio, i.e., they make decisions regarding the initiation, delay, or termination of projects. The job titles of the decision makers were usually chief executive officer, head of business unit, or head of R&D. Portfolio coordinators are usually responsible for actively managing the project portfolio. They had titles such as head of project management office, portfolio manager, division manager, or department manager. This dual-informant design with two different managerial levels reduces common-method bias (Podsakoff et al., 2003) and also provides a better picture of the processes, information flows and responsibilities of the analyzed portfolios. The decision maker provided data for the dependent variable, project portfolio success. Conversely, the portfolio coordinator evaluated the independent variable of relationship value because she is in closer contact with customers and end-users or their representatives. We received 188 decision maker questionnaires and 193 coordinator questionnaires, resulting in 181 matched pairs. Due to missing values, the final sample comprised 174 portfolios (27% response rate). The sample contains organizations from various industries: manufacturing (28%), financial services (19%), information and communication technologies (19%), pharmaceuticals and chemicals (9%), construction and utilities (10%), and other services (15%). Of the participants, 29% have less than 500 employees, 29% employ between 500 and 2000 people, and 42% have more than 2000 employees. On average, a participating project portfolio consists of 125 projects.

### 4.2. Measurement

Variables are based on multi-item scales derived from the recent literature on relationship and customer value as well as PPM and related research fields. We adapted the wording of

some existing scales and refined them to better fit our context. After conceptual foundation, we operationalized the scales by pre-testing them with 20 representatives from academia and practice to assess the face validity of the constructs, remove ambiguities and improve item wording and understanding (Hair et al., 2006). We measured items using a seven-point Likert scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”) unless otherwise stated. A detailed list of items used can be found in the appendix. A confirmatory factor analysis verified the validity of the constructs. All constructs can be seen as reliable because their Cronbach’s alpha is well above 0.7 in all cases (Hair et al., 2006) except the construct on market turbulence, whose alpha equals 0.68.

#### 4.2.1. Dependent variables

We defined *project portfolio success* as a multi-dimensional second-order construct with six sub-constructs: Overall business success (four items), economic success of products and project results (four items), strategic fit (three items), use of synergies (four items), portfolio balance (five items), and future preparedness (three items). The items and constructs were based on the literature (Jonas et al., 2012; Killen et al., 2008; Meskendahl, 2010; Teller et al., 2012) and the decision maker served as the informant.

#### 4.2.2. Independent variables

We draw upon items from recent studies on customer and relationship value (Menon et al., 2005; Ulaga and Eggert, 2006; Walter and Ritter, 2003; Walter et al., 2001) and derived a four-item scale for *relationship value for the customer* and a six-item scale for *relationship value from the customer*. Portfolio coordinators provided data for these two constructs.

#### 4.2.3. Moderating variables

The strength of the effects between relationship value and project portfolio success are assumed to be moderated by the following groups of variables: portfolio type, portfolio complexity, and environmental turbulence. Portfolio type consists of two variables: *the share of R&D projects* (measured from 0 to 1=100%) and *the share of external projects* (the percentage of external vs. internal customers of project results, measured from 0 to 1=100%). Both variables were assessed by the portfolio coordinator. Portfolio complexity comprises *portfolio interdependency* and *portfolio size*, i.e., the number of projects constituting the portfolio. Portfolio interdependency was measured with four items describing whether projects depend on or influence each other (Dammer, 2008; Teller et al., 2012). Portfolio size is captured by a single item representing the natural logarithm of the number of projects in the portfolio. The corresponding items have been assessed by the portfolio coordinator. We measure environmental turbulence with three constructs based on Jaworski and Kohli (1993): market turbulence (four items), technological turbulence (four items) and competitive intensity (four items). These constructs were assessed by the decision maker because she can provide a better overview of the organization’s environment.

#### 4.2.4. Control and contextual factors

In addition to the hypothesized variables, we considered two control variables: *company size* and *type of industry*. First, the size of the participating organization is measured by the natural logarithm of the number of employees in the organization or business unit. Moreover, company size may affect project portfolio performance because larger firms may have more resources and a greater need to implement PPM. Second, the type of industry has been chosen to detect whether the industry sector has a significant effect on the relationship because our study includes participants from various sectors. Table 1 shows the descriptive statistics and correlations of all variables.

### 5. Empirical results

We used hierarchical multiple regression to analyze the effects of relationship value for the customer and relationship value from the customer on project portfolio success, including the hypothesized interaction and moderation effects. The interaction effects between both types of relationship value and the moderating effects were tested by applying the procedures proposed by Aiken et al. (1991). After mean-centering all variables, we included the product-term in the regression model. If the coefficient of the product-term is significant and its consideration increases the explained variance of the model, a moderation effect can be assumed. The results can be found in Table 2 and are illustrated in Fig. 2.

Model A includes only the direct effects of the control variables on project portfolio success. Model B adds the independent variables of relationship value for the customer and relationship value from the customer as well as their interaction effect. Models C through E test particular moderation effects by incorporating the multiplication terms into the model and comparing the results to those of model B. Finally, model F indicates the direct impact of all independent and significant moderation variables on project portfolio success.

Model B shows that both relationship value for the customer ( $b=0.25$ ,  $p<0.01$ ) and relationship value from the customer ( $b=0.13$ ,  $p<0.05$ ) have a significant positive impact on project portfolio success. Consequently, Hypotheses 1 and 2 are supported. However, Hypothesis 3, which relates to the interaction effect between both types of relationship value, is not supported because there is no significant effect. In addition, the control variables for the manufacturing and pharmaceuticals/chemicals industry sectors, technological turbulence, and competitive intensity show a significant and partly strong (industry sectors) positive influence on project portfolio success, which remains rather stable in the following models. Model C tests the interaction effects of both share of external projects and share of R&D projects, which is non-existent; thus, Hypotheses 4a–4d must be rejected.<sup>2</sup>

<sup>2</sup> In addition, we test whether both types of relationship value differed between R&D portfolios vs. non-R&D portfolios and internal vs. non-internal portfolios. We used a median-split on the variables “share of R&D Projects” and “share of internal projects”, respectively, and compared mean values across groups using a *t*-test. There were no significant differences for either type of relationship value.

Table 1  
Descriptive statistics and correlation matrix.

Variables	Mean	Std.	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1 Share of R&D projects	0.40	0.38	0	1																
2 Share of external projects	0.35	0.35	0	1	-0.11															
3 Sector financial services	0.19	0.39	0	1	-0.22***	-0.27***														
4 Sector construct. and utilities	0.10	0.30	0	1	-0.18**	0.16**	-0.15**													
5 Sector inf. and comm. techn.	0.19	0.39	0	1	-0.10	0.29***	-0.22***	-0.15**												
6 Sector manufacturing	0.28	0.45	0	1	0.48***	0.05	-0.29***	-0.20***	-0.30***											
7 Sector pharm./chemicals	0.09	0.28	0	1	0.14*	-0.13*	-0.15**	-0.10	-0.15**	-0.20***										
8 Firm size	7.23	2.13	2.30	12.90	-0.05	-0.21***	0.09	-0.02	-0.12	0.07	-0.02									
9 Portfolio size	3.96	1.35	1.10	10.13	-0.12	0.14*	-0.03	0.03	0.07	0.01	-0.01	0.46***								
10 Technological turbulence	4.41	1.32	1.00	7.00	0.01	0.12	-0.22***	-0.16**	0.38***	-0.05	0.07	-0.08	0.09							
11 Market turbulence	3.41	0.97	1.25	6.00	-0.07	0.19***	-0.04	-0.04	0.30***	-0.21***	0.06	-0.16**	-0.07	0.37***						
12 Competitive intensity	4.00	1.55	1.00	7.00	0.06	0.10	0.10	-0.01	0.04	0.03	-0.02	0.05	-0.05	0.11	0.26***					
13 Complexity	4.05	1.19	1.25	6.75	0.03	-0.06	0.08	-0.17**	0.00	0.12	-0.10	0.01	-0.07	-0.06	-0.16**	-0.03				
14 Value for the customer	5.41	0.84	3.25	7.00	0.10	0.06	-0.08	-0.05	-0.08	0.11	0.08	0.02	0.11	0.06	-0.03	0.05	0.07			
15 Value from the customer	4.44	1.00	1.17	7.00	-0.07	-0.01	0.08	-0.07	0.02	0.03	0.03	-0.01	0.20**	0.03	-0.06	-0.05	0.12	0.20***		
16 Project Portfolio Success	4.92	0.70	2.78	6.67	0.12	0.05	-0.11	-0.08	-0.01	0.19***	0.17**	-0.05	0.04	0.22***	0.00	0.14*	0.05	0.39***	0.27***	

n=174. Dummy coding referenced to sector other service businesses.  
 The table shows descriptive statistics of all variables as well as their correlation matrix.  
 \* p<.1.  
 \*\* p<.05.  
 \*\*\* p<.01.

Table 2  
Results of empirical model.

Variables	Model A		Model B		Model C		Model D		Model E		Model F	
Share or R&D projects	-0.11	(0.17)	-0.12	(0.16)	-0.10	(0.16)	-0.12	(0.15)	-0.14	(0.16)	-0.16	(0.15)
Share of external projects	0.01	(0.17)	0.00	(0.16)	0.00	(0.16)	0.10	(0.16)	-0.01	(0.17)	0.08	(0.16)
Sector financial services	0.13	(0.18)	0.09	(0.17)	0.09	(0.18)	0.03	(0.17)	0.09	(0.18)	0.06	(0.17)
Sector construction and utilities	0.06	(0.21)	0.07	(0.20)	0.06	(0.21)	-0.05	(0.20)	0.16	(0.21)	0.08	(0.20)
Sector inform. and comm. technology	0.06	(0.18)	0.08	(0.17)	0.09	(0.18)	-0.01	(0.17)	0.14	(0.18)	0.06	(0.17)
Sector manufacturing	0.46 **	(0.18)	0.38 **	(0.18)	0.36 **	(0.18)	0.32 *	(0.17)	0.41 **	(0.19)	0.37 **	(0.17)
Sector pharmaceuticals/chemicals	0.61 ***	(0.22)	0.53 **	(0.21)	0.52 **	(0.22)	0.45 **	(0.21)	0.55 **	(0.23)	0.48 **	(0.20)
Firm size <sup>a</sup>	-0.04	(0.03)	-0.02	(0.03)	-0.02	(0.03)	-0.03	(0.03)	-0.02	(0.03)	-0.03	(0.03)
Portfolio size <sup>a</sup>	0.04	(0.05)	-0.01	(0.04)	-0.01	(0.05)	-0.02	(0.04)	-0.02	(0.04)	-0.02	(0.04)
Technological turbulence	0.11 **	(0.05)	0.10 **	(0.04)	0.10 **	(0.04)	0.10 **	(0.04)	0.10 **	(0.04)	0.10 **	(0.04)
Market turbulence	-0.05	(0.06)	-0.04	(0.06)	-0.04	(0.06)	-0.03	(0.06)	-0.04	(0.06)	-0.03	(0.05)
Competitive intensity	0.07 **	(0.04)	0.07 **	(0.03)	0.07 **	(0.03)	0.06 **	(0.03)	0.06 *	(0.04)	0.05 *	(0.03)
Portfolio interdependency	0.03	(0.04)	0.00	(0.04)	0.00	(0.04)	0.02	(0.04)	0.01	(0.04)	0.03	(0.04)
Value for the customer (Value FOR)			0.25 ***	(0.06)	0.25 ***	(0.06)	0.24 ***	(0.06)	0.27 ***	(0.06)	0.27 ***	(0.06)
Value from the cust. (Value FROM)			0.13 **	(0.05)	0.12 **	(0.05)	0.12 **	(0.05)	0.13 **	(0.05)	0.11 **	(0.05)
Value FOR × Value FROM			0.00	(0.06)	0.00	(0.06)	-0.03	(0.06)	-0.01	(0.06)	-0.04	(0.05)
Value FOR × Share of ext. proj.					-0.04	(0.17)						
Value FROM × Share of ext. proj.					-0.06	(0.14)						
Value FOR × Share of R&D proj.					0.02	(0.18)						
Value FROM × Share of R&D proj.					0.04	(0.16)						
Value FOR × Interdependency							0.17 ***	(0.06)			0.19 ***	0.05
Value FROM × Interdependency							0.02	(0.04)				
Value FOR × Portfolio size							0.13 **	(0.05)			0.12 **	0.05
Value FROM × Portfolio size							0.00	(0.04)				
Value FOR × Market turbulence									-0.07	0.07		
Value FROM × Market turbulence									0.02	0.07		
Value FOR × Techn. turbulence									0.11 **	0.05	0.10 **	0.04
Value FROM × Techn. turbulence									-0.02	0.04		
Value FOR × Competitive intensity									0.00	0.04		
Value FROM × Competitive intensity									0.03	0.04		
Constant	4.70 ***	(0.13)	4.74 ***	(0.12)	4.74 ***	(0.13)	4.77 ***	(0.12)	4.70 ***	(0.13)	4.73 ***	(0.12)
F	2.32 ***		4.03 ***		3.17 ***		4.24 ***		3.22 ***		4.92 ***	
R <sup>2</sup>	0.16		0.29		0.29		0.36		0.32		0.38	
Adjusted R <sup>2</sup>	0.09		0.22		0.20		0.27		0.22		0.30	
ΔR <sup>2</sup>			0.13 ***		0.00		0.07 ***		0.03		0.09 ***	

n=174. All independent variables are mean-centered.

Dummy coding referenced to sector other service businesses.

The table shows the results of the hierarchical multiple regression. Both relationship value for and relationship value from the customer are positively related to project portfolio success (model B). The effect of relationship value for the customer is moderated by portfolio interdependency and portfolio size (model D) as well as technological turbulence (model E). All three moderation effects are combined in model F.

<sup>a</sup> Natural logarithm.

\* p<.1.

\*\* p<.05.

\*\*\* p<.01.

Model D includes the interaction effect of both relationship value types with portfolio interdependency and portfolio size. The results show that the interaction of relationship value for the customer both with portfolio interdependency ( $b=0.17$ ,  $p<0.01$ ) and portfolio size ( $b=0.13$ ,  $p<0.05$ ) are significantly positive. Therefore, *Hypotheses 5a and 5b* are supported. However, there is no significant effect in the interaction between relationship value from the customer and both dimensions of complexity. Consequently, *Hypotheses 5c and 5d* must be rejected. Similarly, model E tests the interaction effects of both types of relationship value with environmental turbulence. The interaction with market turbulence yields no significant effect; thus, *Hypotheses 6a and 6d* must be rejected. The interaction with technological turbulence is significantly positive for relationship value for the customer, which supports

*Hypothesis 6b*. The non-existing interaction effect between technological turbulence and relationship value from the customer causes us to reject *Hypothesis 6e*. Finally, there is no interaction effect between competitive intensity and both types of relationship value; thus, *Hypotheses 6c and 6f* must be rejected as well. The combination of the identified significant relationships is presented in model F. The moderation effects are illustrated using simple slopes in *Fig. 3*.

## 6. Discussion and conclusion

This study examines the link between relationship value and project portfolio success. We differentiate between relationship value *for* the customer and relationship value *from* the customer because value must be created for all participating partners in a

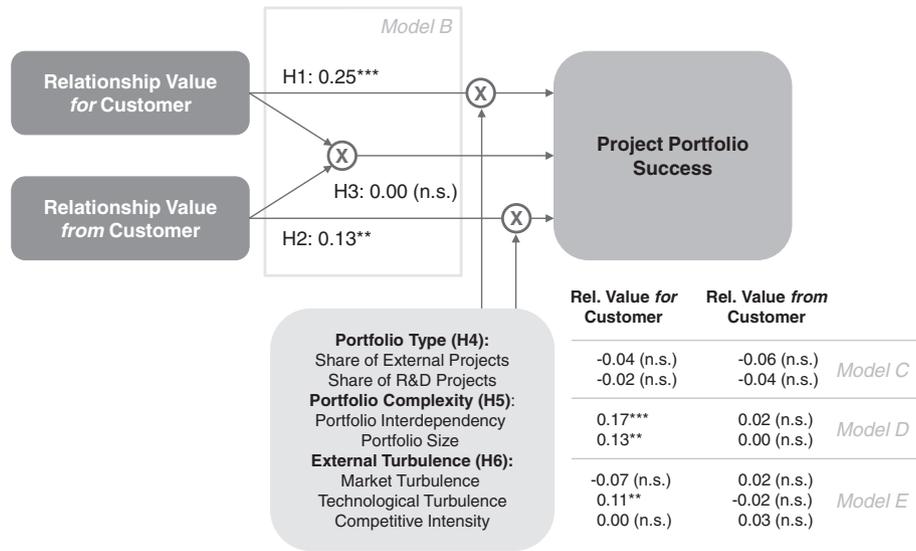


Fig. 2. Empirical result of the link between relationship value and project portfolio success.

business relationship and the respective dimensions of relationship value differ significantly. However, both types of relationship value represent value created by the project portfolio. In addition, we investigated several potential moderating variables to this relationship derived from portfolio characteristics: portfolio type, portfolio complexity, and environmental turbulence. The results show that both types of relationship value independently contribute to project portfolio success and suggest a stronger consideration of the projects' customers within PPM. However, an interaction effect between both types of relationship value is non-existent. Finally, the results suggest that the positive effect of relationship value for the customer is moderated by portfolio interdependency, portfolio size, and technological turbulence. With rising portfolio complexity in a more technologically turbulent environment, the positive effect of the creation of relationship value for the customer becomes even stronger. On the other hand, there is no significant moderating effect of portfolio type or other aspects of environmental turbulence. Regarding relationship value from the customer, there is no moderating effect of the analyzed variables whatsoever. Based on these results, our study contributes to literature on PPM in several ways.

The creation of relationship value is relevant for project portfolio success. This does not end with relationship value for the customer but also includes relationship value from the customer in the portfolio. Thus, a project portfolio setting must also consider the customers of the projects, i.e., the customer portfolio. This consideration is important regardless of whether the portfolio contains R&D or other types of projects. In addition, it is equally relevant for portfolios with external or internal customers. This is a very interesting result because we assumed the relationship to be dependent on portfolio type. Different types of projects might require different project management styles (Dammer, 2008; Shenhar, 2001). The alignment of project portfolios and customer portfolios is relevant nevertheless.

By adopting a contingency perspective on relationship value in project portfolios, the results suggest that relationship value for the customer becomes even more important in complex portfolios – regardless of whether complexity is manifested through portfolio size or interdependency – as well as in an environment with high technological turbulence. The larger and more interdependent a project portfolio becomes, the larger and more complex the customer portfolio also becomes, requiring better alignment between the two portfolios. These results

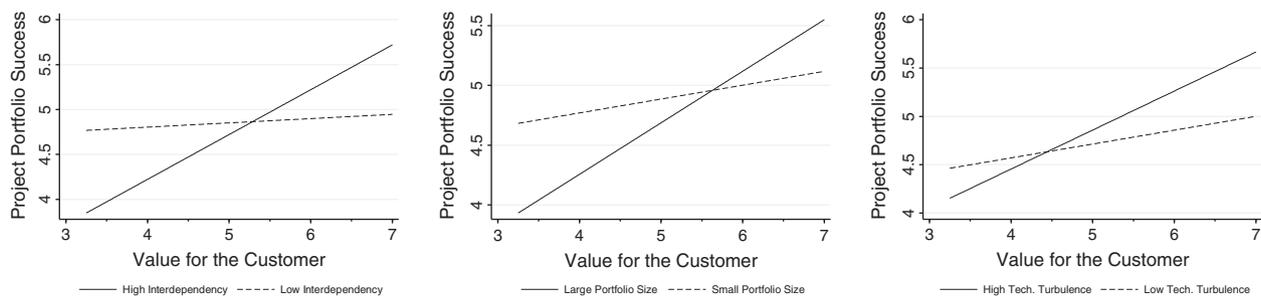


Fig. 3. Graphical representation of moderation effects.

imply that the creation of relationship value for the customer is not just an end in itself and needs to be adjusted to match the characteristics of the portfolio. The findings also suggest that portfolio complexity from an internal perspective can be the most important contingency factor relative to external factors.

Our study has certain implications for the theory and practice of PPM. The study enhances the quickly developing body of knowledge in PPM and merges PPM and strategic marketing approaches for a cross-functional view on PPM, in which it acts as a hub between marketing and the project portfolio (Levine, 2005). Tikkanen et al. (2007) suggest that the maximization of both project portfolios and customer portfolios must be aligned to maximize business performance. However, literature on PPM and its consideration of customers is scarce (Voss, 2012). Our study provides the empirical link between marketing measures and project portfolio measures, and thus between marketing and PPM, with the intention of further developing PPM and better satisfying customer needs.

The results imply two further avenues for investigating the role of the customer in PPM: the antecedents of relationship value and customer integration into PPM. How can relationship value be increased? Which factors influence the relationship value created for the customer and the relationship value created from the customer? Regarding customer integration in a project portfolio setting, what are the different aspects of customer integration or of the integration of a customer representative function? Does customer integration have a different impact at different phases of the PPM process? Customer integration is a crucial success factor in a single project setting (Thomke and von Hippel, 2002). Future studies can use a multi-level research design to investigate the perspective of single projects and project portfolios (Teller et al., 2012).

Our study also enhances the marketing research by presenting a new application for the concept of relationship value in PPM. We suggest a construct for measuring relationship value, both for the customer and for the respective company. Our data show that both types are distinct constructs that independently affect project portfolio success.

Finally, the results of our study verify the relevance of contingency factors in PPM (Howell et al., 2010). In this context, other aspects of a portfolio might be of relevance. So far, we have investigated external sources of portfolio dynamics (market turbulence, technological turbulence, and competitive intensity). Dynamic changes within the portfolio can also be investigated to discover whether they have an interaction effect on the connection between relationship value and project portfolio success.

The managerial implications of this study also relate to the importance of relationship value for project portfolio success. The results imply a close collaboration between the marketing function and PPM because methods to measure relationship value are common in the marketing function, but not within PPM. Marketing would provide important information about the structure of the customer portfolio and the importance of particular customer segments. The analysis of the moderators shows that the creation of relationship value for the customer is especially important in specific environments. However, it also shows that the connection to project portfolio success is not

dependent on the type of portfolio. Therefore, customers must also be considered in portfolios that mainly serve internal customers or are not focused on R&D.

Regarding this study's limitations, the empirical model focuses on the project portfolios of companies located in Germany, Switzerland, and Austria. The findings could be elevated by conducting the study in an international setting that not only includes Europe but also Asia and the Americas in order to capture an international picture and detect possible cultural differences with respect to different perceptions of relationship value because value drivers can be differently perceived in different cultural contexts (Blocker, 2011). Second, relationship value for the customer is measured using data from the supplier company, so it can only be seen as a proxy. An extension of the study including assessments by customers could further increase the significance of the results because there could be differences between the relationship perspectives of buyers and sellers (Geiger et al., 2012). However, including the customers of many large project portfolios in a similar study would significantly increase survey complexity and the applied measures in this study are sufficient to clearly distinguish between the two perspectives.

This study serves as a useful vantage point for further research on the interface between marketing and PPM. The conceptual model can be enhanced to investigate how to build the interface between marketing and PPM. Different aspects of customer integration could be empirically tested for their impact on portfolio success. Considering the finding that portfolio type does not moderate the effect of relationship value on project portfolio success, the results could differ if other aspects of customer integration were investigated. Moreover, other types of antecedents of relationship value can be investigated in terms of the behavior of the involved parties, such as a customer representatives (Kumar, 1999), as well as potential conflicts between the involved parties (Mele, 2011) or relationship quality (Palmatier, 2008).

## Appendix A. List of items

### Project Portfolio Success (6 dimensions, alpha=0.82)

*Overall business success (4 items, alpha = 0.85, adapted from Meskendahl, 2010)*

How do you evaluate the success of your organization/entity compared to your competitors...

- ...regarding the overall business success.
- ...regarding the market share.
- ...regarding the revenue growth.
- ...regarding the profitability.

*Average Project Success (4 items, alpha = 0.71, taken from Jonas et al., 2012)*

- On average our projects achieve a high schedule adherence.
- On average our projects achieve a high budget adherence.
- On average our projects achieve a high quality adherence.

- On average our projects are completed with a high degree of customer satisfaction.

*Future Preparedness (3 items, alpha = 0.82 adapted from Meskendahl, 2010)*

- We sufficiently develop new technologies and/or competencies in our projects.
- With our projects we are a step ahead of our competition with new products, technologies or services.
- The projects enable us to shape the future of our industry.

*Strategic Fit (3 items, alpha = 0.79, taken from Jonas et al., 2012)*

- The project portfolio is consistently aligned with the future of the company.
- The corporate strategy is being implemented ideally through our project portfolio.
- Resource allocation to projects reflects our strategic objectives.

*Portfolio Balance (5 items, alpha = 0.77, taken from Jonas et al., 2012)*

- There is a good balance in our project portfolio between new and old areas of application.
- There is a good balance in our project portfolio between new and existing technologies.
- There is a good balance in our project portfolio of project risks.
- There is a good balance in our project portfolio of projects in different implementation phases (early/late phases).
- There is a good balance in our project portfolio to generate a constant cash-flow.

*Use of Synergies (3 items, alpha = 0.82, taken from Jonas et al., 2012)*

- We are able to leverage synergies between projects in our portfolio.
- We consistently make use of technical synergies (e.g., shared usage of modules, platforms, technologies, etc.) between our projects.
- We consistently make use of market synergies (e.g., shared distribution channels, infrastructure, etc.) between our projects.

### **Relationship Value**

Relationship Value for the Customer (4 items, alpha = 0.85, derived from Menon et al., 2005; Ulaga and Eggert, 2006)

- We fulfill needs of our customers ideally.
- Our customers are very satisfied with our output.
- Problems encountered by our customers are quickly being handled and solved.
- We do anything to be a trustful partner for our customers.

Relationship Value from the Customer (6 items, alpha = 0.74, derived from Walter and Ritter, 2003; Walter et al., 2001)

- Most of our customers are long-term and reliable customers of our portfolio.
- Our customers actively engage in value creation for our portfolio.
- Our customers provide us with essential information on the market and/or competitors.
- Our customers actively promote us at other potential customers due to the quality of our output.
- Our customers contribute substantial ideas for new projects to our portfolio.
- Our customers provide us with information on potential customers.

### **Portfolio Complexity**

Portfolio Interdependency (4 items, alpha = 0.84, based on Teller et al., 2012)

- A high degree of alignment between our projects is required with respect to scope and content.
- Scope changes of individual projects inevitably impact the execution of other projects.
- Projects can often only be continued when exploitable results of other projects are known.
- Delays in individual projects inevitably impact other projects.

**Environmental Turbulence (taken from Jaworski and Kohli, 1993)**

Market Turbulence (4 items, alpha = 0.68)

- In our kind of business, customers' product preferences change quite a bit over time.
- Our customers tend to look for new product all the time.
- We are witnessing demand for our products and services from customers who never bought them before.
- New customers tend to have product-related needs that are different from those of our existing customers.

Technological Turbulence (4 items, alpha = 0.87)

- The technology in our industry is changing rapidly.
- Technological changes provide big opportunities in our industry.
- A large number of new product ideas have been made possible through technological breakthroughs in our industry.
- Technological developments in our industry are rather minor. (inverse item)

Competitive Intensity (4 items, alpha = 0.75)

- Competition in our industry is cutthroat.
- Anything that one competitor can offer, others can match readily.
- Price competition is a hallmark of our industry.
- One hears of a new competitive move almost every day.

## References

- Aiken, L.S., West, S.G., Reno, R.R., 1991. *Multiple Regression: Testing and Interpreting Interactions*. Sage Publications, Newbury Park, CA.
- Anderson, J.C., 1995. Relationships in business markets: Exchange episodes, value creation, and their empirical assessment. *Journal of the Academy of Marketing Science* 23, 346–350.
- Anderson, J.C., Narus, J.A., 1999. *Business markets management: Understanding, creating, and delivering value*. Prentice Hall, Upper Saddle River, NJ.
- Anderson, J.C., Häkansson, H., Johanson, J., 1994. Dyadic business relationships within a business network context. *Journal of Marketing* 58, 1–15.
- Archer, N.P., Ghasemzadeh, F., 1999. An integrated framework for project portfolio selection. *International Journal of Project Management* 17, 207–216.
- Archer, N.P., Ghasemzadeh, F., 2004. Project portfolio selection and management. In: Morris, P.W.G., Pinto, J.K. (Eds.), *The Wiley Guide to Managing Projects*. John Wiley & Sons, New York, NY.
- Arto, K., Wikström, K., 2005. What is project business? *International Journal of Project Management* 23, 343–353.
- Baccarini, D., 1996. The concept of project complexity — a review. *International Journal of Project Management* 14, 201–204.
- Barry, J., Terry, T.S., 2008. Empirical study of relationship value in industrial services. *The Journal of Business and Industrial Marketing* 23, 228–241.
- Blocker, C.P., 2011. Modeling customer value perceptions in cross-cultural business markets. *Journal of Business Research* 64, 533–540.
- Boulding, W., Staelin, R., Ehret, M., Johnston, W.J., 2005. A customer relationship roadmap: what is known, potential pitfalls, and where to go. *Journal of Marketing* 69, 155–166.
- Čater, B., Čater, T., 2009. Relationship-value-based antecedents of customer satisfaction and loyalty in manufacturing. *The Journal of Business and Industrial Marketing* 24, 585–597.
- Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J., 2002. Portfolio management: fundamental to new product success. In: Belliveau, P., Griffin, A., Somermeyer, S. (Eds.), *The PDMA Toolbook for New Product Development*. John Wiley & Sons, New York, NY, pp. 331–364.
- Corsaro, D., Snehota, I., 2010. Searching for relationship value in business markets: are we missing something? *Industrial Marketing Management* 39, 986–995.
- Cusumano, M.A., Nobeoka, K., 1998. *Thinking Beyond Lean. How Multi-project Management is Transforming Product Development at Toyota and Other Companies*. The Free Press, New York.
- Dammer, H., 2008. *Multiprojektmanagement*. Gabler, Wiesbaden.
- Danneels, E., Kleinschmidt, E.J., 2001. Product innovativeness from the firm's perspective: its dimensions and their relation with project selection and performance. *Journal of Product Innovation Management* 18, 357–373.
- Donaldson, L., 2001. *The Contingency Theory of Organizations*. Sage Publications, Thousand Oaks, London, New Dehli.
- Dye, L.D., Pennypacker, J.S., 1999. *Project Portfolio Management. Selecting and Prioritizing Projects for Competitive Advantage*. Center of Business Practices. A Division of PM Solutions, Inc., West Chester, PA.
- Edvardsson, B., Tronvoll, B., Gruber, T., 2010. Expanding understanding of service exchange and value co-creation: a social construction approach. *Journal of the Academy of Marketing Science* 39, 327–339.
- Elonen, S., Arto, K., 2003. Problems in managing internal development projects in multi-project environments. *International Journal of Project Management* 21, 395–402.
- Engwall, M., Jerbrant, A., 2003. The resource allocation syndrome: the prime challenge of multi-project management? *International Journal of Project Management* 21, 403–409.
- Ernst, H., Hoyer, W., Krafft, M., Krieger, K., 2011. Customer relationship management and company performance — the mediating role of new product performance. *Journal of the Academy of Marketing Science* 39, 290–306.
- Flint, D.J., Blocker, C.P., Boutin Jr., P.J., 2011. Customer value anticipation, customer satisfaction and loyalty: an empirical examination. *Industrial Marketing Management* 40, 219–230.
- Gallarza, M.G., Gil-Saura, I., Holbrook, M.B., 2011. The value of value: further excursions on the meaning and role of customer value. *Journal of Consumer Behaviour* 10, 179–191.
- Geiger, I., Durand, A., Saab, S., Kleinaltenkamp, M., Baxter, R., Lee, Y., 2012. The bonding effects of relationship value and switching costs in industrial buyer-seller relationships: an investigation into role differences. *Industrial Marketing Management* 41, 82–93.
- Gemünden, H.G., Heydebreck, P., Herden, R., 1992. Technological interweavement: a means of achieving innovation success. *R&D Management* 22, 359–376.
- Grönroos, C., 1994. From marketing mix to relationship marketing — towards a paradigm shift in marketing. *Management Decision* 32, 4–20.
- Grönroos, C., Helle, P., 2012. Return on relationships: conceptual understanding and measurement of mutual gains from relational business engagements. *The Journal of Business and Industrial Marketing* 27, 344–359.
- Gummesson, E., 2004. Return on relationships (ROR): the value of relationship marketing and CRM in business-to-business contexts. *The Journal of Business and Industrial Marketing* 19, 136–148.
- Haas, A., Snehota, I., Corsaro, D., 2012. Creating value in business relationships: the role of sales. *Industrial Marketing Management* 41, 94–105.
- Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C., 2006. *Multivariate Data Analysis*. Prentice-Hall, Upper Saddle River, NJ.
- Hobbs, B., 2012. Editorial — special issue on project portfolio management. *International Journal of Project Management* 30, 523–524.
- Homburg, C., Workman, J.P., Jensen, O., 2002. A configurational perspective on key account management. *Journal of Marketing* 66, 38–60.
- Homburg, C., Steiner, V.V., Totzek, D., 2009. Managing dynamics in customer portfolio. *Journal of Marketing* 73, 70–89.
- Howell, D., Windahl, C., Seidel, R., 2010. A project contingency framework based on uncertainty and its consequences. *International Journal of Project Management* 28, 256–264.
- Jaworski, B.J., Kohli, A.K., 1993. Market orientation: antecedents and consequences. *Journal of Marketing* 57, 53–70.
- Johnson, M., Selnes, F., 2005. Diversifying your customer portfolio. *Sloan Management Review* 46, 11–14.
- Jonas, D., Kock, A., Gemünden, H.G., 2012. Predicting Project Portfolio Success by Measuring Management Quality — A Longitudinal Study. *IEEE Transactions on Engineering Management* 99, 1–12. <http://dx.doi.org/10.1109/TEM.2012.2200041>.
- Killen, C.P., Kjaer, C., 2012. Understanding project interdependencies: the role of visual representation, culture and process. *International Journal of Project Management* 30, 554–566.
- Killen, C.P., Hunt, R.A., Kleinschmidt, E.J., 2008. Project portfolio management for product innovation. *International Journal of Quality and Reliability Management* 25, 24–38.
- Killen, C.P., Jugdev, K., Drouin, N., Petit, Y., 2012. Advancing project and portfolio management research: applying strategic management theories. *International Journal of Project Management* 30, 525–538.
- Kim, J., Wilemon, D., 2009. An empirical investigation of complexity and its management in new product development. *Technology Analysis and Strategic Management* 21, 547–564.
- Kumar, P., 1999. The impact of long-term client relationships on the performance of business service firms. *Journal of Service Research* 2, 4–18.
- Lam, S.Y., Shankar, V., Erramilli, M.K., Murthy, B., 2004. Customer value, satisfaction, loyalty, and switching costs: an illustration from a business-to-business service context. *Journal of the Academy of Marketing Science* 32, 293–311.
- Lechler, T., Dvir, D., 2010. An alternative taxonomy of project management structures: linking project management structure and project success. *IEEE Transactions on Engineering Management* 57, 198–210.
- Lefaix-Durand, A., Kozak, R., 2010. Comparing customer and supplier perceptions of value offerings: an exploratory assessment. *Journal of Business Market Management* 4, 129–150.
- Lefaix-Durand, A., Kozak, R., Beauregard, R., Poulin, D., 2009. Extending relationship value: observations from a case study of the Canadian structural

- wood products industry. *The Journal of Business and Industrial Marketing* 24, 389–407.
- Levine, H.A., 2005. *Project Portfolio Management — A Practical Guide to Selecting Projects, Managing Portfolios, and Maximizing Benefits*. Jossey-Bass, San Francisco, CA.
- Levinthal, D.A., Warglien, M., 1999. Landscape design: designing for local action in complex worlds. *Organization Science* 10, 342–357.
- Lindgreen, A., Wynstra, F., 2005. Value in business markets: what do we know? Where are we going? *Industrial Marketing Management* 34, 732–748.
- Martinsuo, M., Lehtonen, P., 2007. Role of single-project management in achieving portfolio management efficiency. *International Journal of Project Management* 25, 56–65.
- Mele, C., 2011. Conflicts and value co-creation in project networks. *Industrial Marketing Management* 40, 1377–1385.
- Menon, A., Homburg, C., Beutin, N., 2005. Understanding customer value in business-to-business relationships. *Journal of Business-to-Business Marketing* 12, 1–38.
- Meskendahl, S., 2010. The influence of business strategy on project portfolio management and its success — a conceptual framework. *International Journal of Project Management* 28, 807–817.
- Möller, K.E., Törrönen, P., 2003. Business suppliers' value creation potential: a capability-based analysis. *Industrial Marketing Management* 32, 109–118.
- Palmatier, R.W., 2008. Interfirm relational drivers of customer value. *Journal of Marketing* 72, 76–89.
- Pattikawa, L.H., Verwaal, W., Commandeur, H.R., 2006. Understanding new product project performance. *European Journal of Marketing* 40, 1178–1193.
- Petit, Y., 2012. Project portfolios in dynamic environments: organizing for uncertainty. *International Journal of Project Management* 30, 539–553.
- Petit, Y., Hobbs, B., 2010. Project portfolios in dynamic environments: sources of uncertainty and sensing mechanisms. *Project Management Journal* 41, 46–58.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88, 879–903.
- Ravald, A., Grönroos, C., 1996. The value concept and relationship marketing. *European Journal of Marketing* 30, 19–30.
- Ritter, T., Walter, A., 2012. More is not always better: the impact of relationship functions on customer-perceived relationship value. *Industrial Marketing Management* 41, 136–144.
- Sharma, A., Tzokas, N., Saren, M., Kyziridis, P., 1999. Antecedents and consequences of relationship marketing: insights from business service salespeople. *Industrial Marketing Management* 28, 601–611.
- Shenhar, A.J., 2001. One size does not fit all projects: exploring classical contingency domains. *Management Science* 47, 394–414.
- Shenhar, A.J., Dvir, D., Levy, O., Maltz, A.C., 2001. Project success: a multidimensional strategic concept. *Long Range Planning* 34, 699–725.
- Skaates, M.A., Tikkanen, H., Lindblom, J., 2002. Relationships and project marketing success. *The Journal of Business and Industrial Marketing* 17, 389–406.
- Söderholm, A., Gemünden, H.G., Winch, G.M., 2008. Projects and programmes: strategies for creating value in the face of uncertainty: papers presented at EURAM 2007. *International Journal of Project Management* 26, 1–3.
- Srivastava, R.K., Shervani, T.A., Fahey, L., 1999. Marketing, business processes, and shareholder value: an organizationally embedded view of marketing activities and the discipline of marketing. *Journal of Marketing* 63, 168–179.
- Tatikonda, M.V., Rosenthal, S.R., 2000. Technology novelty, project complexity, and product development project execution success: a deeper look at task uncertainty in product innovation. *IEEE Transactions on Engineering Management* 47, 74–87.
- Teece, D.J., 2007. Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal* 28, 1319–1350.
- Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* 18, 509–533.
- Teller, J., Unger, B.N., Kock, A., Gemünden, H.G., 2012. Formalization of project portfolio management: the moderating role of portfolio complexity. *International Journal of Project Management* 30, 596–607.
- Terho, H., 2009. A measure for companies' customer portfolio management. *Journal of Business-to-Business Marketing* 16, 374–411.
- Thomke, S., von Hippel, E., 2002. Customers as innovators — a new way to create value. *Harvard Business Review* 80, 74–81.
- Tikkanen, H., Kujala, J., Artto, K., 2007. The marketing strategy of a project-based firm: the four portfolios framework. *Industrial Marketing Management* 36, 194–205.
- Uлага, W., Eggert, A., 2006. Value-based differentiation in business relationships: gaining and sustaining key supplier status. *Journal of Marketing* 70, 119–136.
- Unger, B.N., Kock, A., Gemünden, H.G., Jonas, D., 2012. Enforcing strategic fit of project portfolios by project termination: an empirical study on senior management involvement. *International Journal of Project Management* 30, 675–685.
- Voss, M., 2012. Impact of customer integration on project portfolio management and its success — developing a conceptual framework. *International Journal of Project Management* 30, 567–581.
- Walter, A., Ritter, T., 2003. The influence of adaptations, trust, and commitment on value-creating functions of customer relationships. *The Journal of Business and Industrial Marketing* 18, 353.
- Walter, A., Ritter, T., Gemünden, H.G., 2001. Value-creation in buyer-seller relationships: theoretical considerations and empirical results from a supplier's perspective. *Industrial Marketing Management* 30, 365–377.
- Williams, T.M., 1999. The need for new paradigms for complex projects. *International Journal of Project Management* 17, 269–273.
- Wilson, D.T., 1995. An integrated model of buyer-seller relationships. *Journal of the Academy of Marketing Science* 23, 335–345.
- Winter, M., Szczepanek, T., 2008. Projects and programmes as value creation processes: a new perspective and some practical implications. *International Journal of Project Management* 26, 95–103.