



# Classifying project management resources by complexity and leverage

Project  
management  
resources

105

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## Abstract

**Purpose** – The purpose of this paper is to present a conceptual framework to classify project management resources as sources of competitive advantage.

**Design/methodology/approach** – The paper draws on the resource-based view of the firm and project management literature to explore the level of competitive advantage from 17 project management resources based on their degree of complexity and level of leverage in the project management process. This exploratory study drew on a small sample of practitioners in the classification.

**Findings** – The paper proposes a conceptual model to show the relationship between four categories of resources and their contribution to competitive advantage by being valuable, rare, inimitable, and organizationally supported.

**Research limitations/implications** – This paper is exploratory in nature and uses a small sample of practitioners.

**Practical implications** – The authors believe that the classification of project management resources based on complexity and leverage provides a useful framework for managers considering the impact of investment in these resources for competitive advantage.

**Originality/value** – This paper provides a classification of project management resources based on the complexity of the resource and its leverage in the project management process. It is posited that resources that are complex and can be highly leveraged to develop further resources warrant attention as sources of competitive advantage.

**Keywords** Project management, Resource management, Competitive advantage, Project management resources, Resource-based view, Strategic resources

**Paper type** Research paper

## 1. Introduction

Competitive pressures such as time to market, customer and supplier demands, product complexity, and the growth of international competition are just some of the factors that contribute to project management gaining ground as an important source of an organization's competitive advantage (Cleland and Ireland, 2002; Pinto, 2001, 2010). As firms strive to maintain their dominance in the marketplace, competitive advantage can disappear in a flash, when rival firms create newer, different, more efficient, or more highly sought-after products and services. Increasingly, firms are focusing on project management as a discipline, with its related tools, techniques, and processes, to help leverage their resources to maintain competitive parity and seek competitive advantage. We find that there is insufficient research that addresses how project management contributes to competitive advantage (DeFillippi and Arthur, 1998). Given the



increasing adoption of project management practices in the industry, we believe that an improved understanding of project management as a source of competitive advantage motivates further investigation.

Since it is not resources alone that are important, but also what is done with them, we draw on resource frameworks from the strategic management literature to examine project management resources and their contribution to a firm's competitive advantage. This line of inquiry is in keeping with prior investigations that focused on the application of the resource-based view (RBV) of the firm (Barney, 1991, 1986; Barney *et al.*, 2001; Rumelt, 1984; Wernerfelt, 1984). The specific emphasis in this paper is on project management resource categorizations based on their degree of complexity and level of leverage in the project management process (Brush *et al.*, 2001) and the competitive advantage that can be attained from these resources through their being valuable, rare, and inimitable, and having organizational support (Barney, 1991; Barney *et al.*, 2001). In this paper, we address the following research question:

*RQ.* What is the level of competitive advantage from various project management resources based on their degree of complexity and level of leverage?

Our paper is organized as follows. The literature review section draws on the RBV of the firm, focuses on project management resources as a source of competitive advantage, and examines frameworks that contribute typologies for classifying resources based on their contribution to competitive advantage. Then, we present the methodology for our research, analysis of our findings, and conclusions. The contribution of this paper is a framework to classify project management resources by complexity and leverage.

## 2. Literature review

### 2.1 RBV of the firm

Stemming from Penrose's classic work on how firms grow (Penrose, 1959) the RBV of the firm was developed about 20 years ago. This perspective examines how a firm's resources (e.g. financial, human, organizational, physical, social, technological) are drivers of competitive advantage. Only a subset of a company's resources, its strategic assets or strategic resources, contribute to its competitive advantage (Amit and Schoemaker, 1993). These strategic resources involve explicit and tacit knowledge (Eisenhardt and Santos, 2000; Kaplan *et al.*, 2001; Kogut, 2000; Nonaka, 1994) that is embedded in a company's unique skills, knowledge, resources, and ways of working (Foss, 1997; Rumelt *et al.*, 1994). As a perspective, the RBV literature has yet to develop a consistent vocabulary. Current synonyms for strategic resources include core competences (Prahalad and Hamel, 1990), distinctive competence (Selznick, 1957), dynamic capability (Teece *et al.*, 1997), dynamic routines (Collis, 1991), indivisible assets (Teece, 1980), integrative capabilities, implicit/social knowledge, meta-capability (Kaplan *et al.*, 2001), organizational architecture (Henderson and Cockburn, 1994), and organizational capability. The term knowledge-based view is sometimes used as a distinct perspective from the RBV, though the RBV includes knowledge-based resources (Amburgey and Rotman, 2001; Brown and Duguid, 1998; Eisenhardt and Santos, 2000).

As firms compete, they strive to achieve competitive advantage by using cost and differentiation strategies (Grant, 2010). Many move themselves out of positions of competitive disadvantage to positions of competitive parity and temporary competitive advantage, yet few achieve or maintain a sustained competitive advantage. Our research

applies the RBV to understand which project management resources are most likely to be strategic resources. This paper is a part of our ongoing research to understand which project management resources are most likely to be strategic resources (Jugdev and Mathur, 2006; Jugdev *et al.*, 2007; Mathur *et al.*, 2007).

Strategic resources have been classified in different and overlapping ways. Barney (1991) viewed resources as physical, human, and capital (Barney, 1991). Grant (1991) expanded this list by including the technological and reputational groupings (Grant, 1991). An alternative classification labels resources as property-based or tangible (i.e. concrete; physical; codified or based on explicit knowledge) versus knowledge based or intangible (i.e. tacit; unspoken but understood) (Miller and Shamsie, 1996). While tangible resources enable a firm to execute its business processes, it is the intangible ones that are more likely to serve as sources for competitive advantage (Brush *et al.*, 2001; Eisenhardt and Santos, 2000; Ray *et al.*, 2004).

Within the RBV, the VRIO framework characterizes strategic resources as those that are valuable (provide economic value), rare (unique), and inimitable (difficult to copy), and involve organizational support (management support, processes, and systems) (Barney, 1991). A firm achieves competitive parity when it has resources that are valuable. When it has resources that are both valuable and rare, the firm achieves a temporary competitive advantage. When the firm has resources that are valuable, rare, and inimitable, it achieves a sustained competitive advantage. In each case, these resources require organizational support to contribute to competitive parity or competitive advantage. As a firm transitions from competitive parity to a sustained competitive advantage, there is increasing evidence of organizational support in relation to these resources. Consequently, strategic resources are important, yet what matters even more is the context in which they are deployed and the managerial emphasis that is exercised in their administration (Coff, 1997).

As a recent review indicates, the RBV continues to hold merit (Kraaijenbrink *et al.*, 2010). Both the RBV of the firm and its related VRIO framework have been used in a number of empirical studies (Alvarez and Busenitz, 2001; Lockett and Thompson, 2001; Newbert, 2007; Peng, 2001; Schilling and Steensma, 2002; Srivastava *et al.*, 2001; Wright *et al.*, 2001). Research that anchors project management to the RBV is, however, still in its infancy.

### *2.2 Review of literature on project management using the RBV of the firm*

Our review of the project management literature indicates the stream of research that uses the RBV of the firm is evolving (Jugdev *et al.*, 2007; Mathur *et al.*, 2007). Project management is a set of processes that encompasses the tools, techniques, and knowledge-based practices applied to projects in order to achieve organizational goals and deliver products or services (DeFillippi and Arthur, 1998; Fernie *et al.*, 2003; Project Management Institute, 2008). Project management practices involve tangible and intangible assets. Tangible resources involve codified or explicit knowledge while intangible resources are based on tacit knowledge. Codified and tacit knowledge have also been labeled “know-what” and “know-how” (Nonaka, 1994).

To date, considerable project management literature has focused on the tangible resources and codified knowledge shared through research on project management offices, methodologies, databases, documents, and tools and techniques (Aubry *et al.*, 2007, 2008; Besner and Hobbs, 2006, 2008; Hobbs and Aubry, 2007;

Kloppenborg and Opfer, 2002; Ulri and Ulri, 2000; White and Fortune, 2002). Following the logic of the RBV, the lesser studied intangible project management resources are more likely to be rare and inimitable, and therefore more likely to be sources of competitive advantage. Intangible project management resources include tacit knowledge, the application and sharing of tacit knowledge, and processes and relationships for facilitating this sharing. Tacit knowledge is shared informally through social exchanges (Granovetter, 1985; Tsoukas, 1991), and some examples in project management include brainstorming, mentoring, learning through shadowing, and storytelling (Egbu, 2004; Leonard and Sensiper, 1998).

An earlier study of project management in the strategic resource context involved qualitative field research on a US-UK feature film where those involved were essentially temporary project team members (DeFillippi and Arthur, 1998). DeFillipi argued that although projects involved mobile and rented personnel (human capital), they could accumulate core competencies, transmit tacit knowledge and transfer knowledge, and create a competitive advantage through possessing inimitable resources. The VRIO framework was also used to conceptually assess the tangible assets of project management maturity models. These models consist of progressive stages of codified processes and practices. The paper showed that the project management maturity models were valuable but did not meet all the VRIO criteria of strategic assets.

Empirical contributions to an understanding of project management using the RBV include:

- (1) Schedule estimating and management capabilities positively affected project revenue; client-specific capabilities had a modest positive impact on project revenue (Ethiraj *et al.*, 2005).
- (2) Tangible assets predicted project management as being valuable and having organizational support (competitive parity); intangible assets predicted project management as valuable and rare (temporary advantage); tangible assets predicted project management as rare (temporary advantage) when mediated by intangible assets (i.e. sharing know-how) (Jugdev and Mathur, 2006; Jugdev *et al.*, 2007; Mathur *et al.*, 2007). Our prior findings follow:
  - Tangible assets include the following factors:
    - project management maturity (i.e. the use of a project management office, tools and techniques, methodology, standards, processes, program and portfolio management practices, and efficiency and effectiveness practices);
    - training and development (i.e. management support for training and development, development of project manager competences, support for project management certification, and a career path for project managers); and
    - sharing know-what (i.e. codified knowledge sharing practices – the use of databases, systems, intranets, best-practices databases, and processes for sharing knowledge).
  - Intangible assets include the following factor: sharing know-how (i.e. different ways in which tacit knowledge was shared – informal knowledge sharing, mentoring, stories, brainstorming, and shadowing).

- (3) Improvement and innovation routines were distinct bundles that significantly related to operational performance (Peng *et al.*, 2007).
- (4) Distinctive visibility of information sharing met the VRIO criteria (Barratt and Oke, 2007).
- (5) Functional areas integrated through organizational knowledge contributed to valuable and rare product features (Paiva *et al.*, 2008).

Given that the RBV is an evolving perspective and that research applying the RBV lens to project management is in its infancy, we examined project management resources classifications to gain an improved understanding of how the resource groupings might be used to aid managers in strategically developing these resources for competitive advantage.

### 2.3 Resource typologies

We agree with the statement that:

If the firm's resources are unique, rare, valuable, and inimitable, they can be a source of core capabilities and ultimately a competitive advantage, provided there is an appropriate strategy for deployment (Brush *et al.*, 2001, p. 64).

A few RBV scholars have developed resource frameworks to show preliminary groupings of resource elements in a logical order and depict how these components fit into an overall structure. Some frameworks group resources on the basis of complexity, and others look at complexity as well as use (Barney, 1991, 1998; Brush *et al.*, 2001; Grant, 1991; Marino, 1996; Thomas *et al.*, 1999). Brush *et al.* identified six resource types: human (individual skills, knowledge), social (external relationships, networks), financial (personal wealth), physical, technological, and organizational (internal structures, processes, relationships) assets. Their framework provides an analytical tool to classify resources and assess entrepreneurial firms and the building of their resource portfolio over time. We draw on their resource typology in our paper and refer to it as the Brush framework in the rest of this discussion. The Brush framework is shown in Figure 1.

In the  $2 \times 2$  classification matrix in Figure 1, the "resource type" scale anchors are "simple" and "complex". The "resource application" scale anchors are "utilitarian" and "instrumental". As discussed by Brush *et al.* (2001, p. 67):

Simple resources are tangible, discrete, and property-based, whereas complex resources are intangible, systematic, and knowledge based. For example, financial resources are relatively simple in the sense that they are more tangible and quantifiable, whereas human resources are complex and often intangible, systematic, and knowledge based. For example, financial resources are complex and often intangible, making them difficult to identify and measure.

They explain:

Utilitarian resources are applied directly to the productive process or combined to develop other resources. For instance, physical resources, such as machinery, trucks, or office space, can be considered utilitarian in producing a product or service. Instrumental resources are used specifically to provide access to other resources. For example, financial resources are considered to be instrumental because they are flexible and can be used to obtain other resources, such as people or equipment.

		RESOURCE APPLICATION	
		Utilitarian	Instrumental
RESOURCE TYPE	Complex	Quadrant 3	Quadrant 4
	Simple	Quadrant 1	Quadrant 2

Source: Adapted from Brush *et al.* (2001)

Figure 1.  
Brush framework for  
classification of resources

We propose that complex-instrumental resources are the most likely to be a source of competitive advantage (quadrant 4). These resources are complex, knowledge-based assets which are hard to identify and measure (Brush *et al.*, 2001, p. 67), not tradable (Priem and Butler, 2001; Wernerfelt, 1984), and embedded in an organization (Szulanski, 1996), thus making them harder for competitors to imitate.

To summarize, the RBV literature enables us to assess resources as tangible and intangible as well as simple and complex. The Brush framework presents us with a typology to consider in terms of resource type and application. In the methodology we describe below, we used the Brush framework because we believe it holds promise for project management. Well-known and commonly used project management resources include hardware, software, methodologies, decision-making tools, databases, information systems, bodies of knowledge, templates, maturity models, project management offices, communities of practice, mentoring, and social capital. Given this backdrop, our research question is:

RQ. What is the level of competitive advantage from various project management resources based on their degree of complexity and level of leverage?

### 3. Methodology

Based on the extant literature on project management and prior research (Besner and Hobbs, 2004; Jugdev and Thomas, 2002; Kerzner, 2001; White and Fortune, 2002), we developed a list of 17 project management resources:

- (1) hardware;
- (2) software (e.g. Microsoft Project, Primavera®);



- (3) project management methodologies;
- (4) decision-making tools;
- (5) databases;
- (6) information systems;
- (7) project management maturity models;
- (8) mentoring;
- (9) project management offices;
- (10) communities of practice;
- (11) personal competences;
- (12) experience;
- (13) skills;
- (14) aptitudes;
- (15) organizational policies and procedures;
- (16) project management templates; and
- (17) project management bodies of knowledge.

We designed a pilot study to position project management resources on the  $2 \times 2$  matrix shown in Figure 1. We conducted a pre-test with five colleagues for list comprehensiveness, instruction clarity, and to confirm that the pre-testers were able to categorize the resources. Using a convenience sample we then sent e-mail requests to 20 industry colleagues to get practitioner input. Ten participants responded to our e-mail request for a response rate of 50 percent. In the e-mail, we explained the resource categories, the differences between tangible and intangible resources, and the terms from the Brush framework axes, along with an adaptation of Figure 1. We asked participants to add resources to our list and requested them to categorize each resource in one of the four quadrants. Participants received a table listing each resource in a row, followed by room to identify the quadrant and add comments to explain their choice for each resource as well as any difficulties they encountered in their classification decision. Participants were informed that resources could be categorized as follows:

- financial resources (money);
- physical resources (machinery, equipment, office space, location);
- technological resources (technology know-how);
- human resources (individual skills, knowledge, experience, reputation, education);
- organizational resources (internal structures, processes, systems and procedures); and
- social resources (external relationships, networks, industry contacts, professional associations).

Participants were also informed that financial, physical, and technological resources are tangible and concrete whereas human, organizational, and social resources are complex and intangible (some might say, invisible). They were told that resources can also be

classified in a  $2 \times 2$  matrix where the  $X$  (horizontal) axis is on resource complexity (simple-complex) and the  $Y$  (vertical) axis is on use (utilitarian-instrumental) (Brush *et al.*, 2001). The descriptions provided to the participants were as follows:

- Simple resources are tangible, discrete, and property based.
- Complex resources are intangible, systemic, and knowledge based. Complex resources can be transformed, combined, or lead to a unique competitive advantage. Complex resources can be hard to identify and measure.
- Utilitarian resources have a single use or they can be combined to develop other resources. For example, machinery, trucks, or office spaces are utilitarian resources.
- Instrumental resources have multiple uses and are flexible. For example, financial resources are simple yet instrumental because they are needed to purchase other resources, such as people or equipment.

We used participant feedback to determine which quadrant to place each resource in. We spaced the resources within each quadrant using participant feedback and our understanding of the resources and assessment of their complexity and their leverage in the project management process. Details on practitioner classification and our interpretation are discussed in the section that follows.

#### 4. Classification and analysis of project management resources

In this section, we discuss the project management resources that we have classified into the four quadrants of the Brush framework. We draw on Barney's VRIO framework to propose relationships between these resources and the achievement of VRIO characteristics and competitive advantage from the project management process.

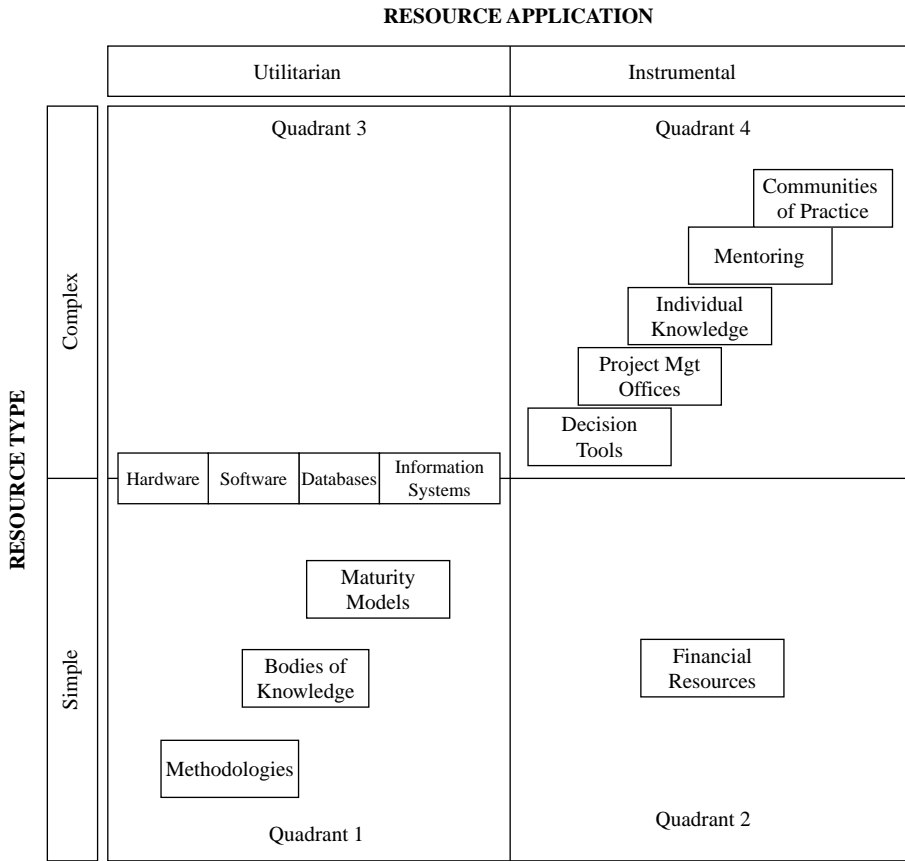
Participant feedback on 17 project management resources is provided in Table I, and resources are categorized into the four quadrants of the Brush framework in Figure 2.

We combined some of the items after the pre-test into more generic categories into which they were interpreted. The list of 17 resources that our study participants had

Resource	Quadrant
Hardware	1, 3
Software (e.g. Microsoft Project, Primavera <sup>®</sup> )	1, 3
Project management methodologies	4
Decision-making tools	4
Databases	1, 3
Information systems	1, 3
Project management bodies of knowledge	1
Mentoring	4
Project management maturity models	1
Project management offices	4
Communities of practice	4
Personal competences	4
Experience	4
Skills	4
Aptitudes	4
Organizational policies and procedures	1
Project management templates	1

**Table I.**  
Practitioner classification  
of project management  
resources





Source: Adapted from Brush *et al.* (2001)

**Figure 2.**  
A framework for classifying project management resources

classified included personal competences, experience, skills, and aptitudes. We clustered these four resources into a resource set labeled “individual knowledge”. Organizational policies and procedures and project management templates were included in bodies of knowledge and methodologies, respectively.

Note, that we did not include “financial resources” as an item in the list of 17 project management resources but included it in Figure 2, because financial assets are simple, yet instrumental in acquiring the others.

The eight resources that are categorized in quadrants 1 and 2 were deemed by us to reflect overwhelming agreement in these classifications by the respondents (eight or more of the ten respondents). Practitioner feedback indicated that the resources in quadrant 1 were the easiest for them to categorize. Some participants placed project management hardware, software, databases, and information systems in quadrant 1 and others in quadrant 3 (less than seven agreed). To resolve the conflict, we placed these four resources in both quadrants and conclude that if we were to elaborate

on the particular specification of these resources, we would likely find them distributed between quadrants 1 and 3 based on the complexity of hardware, software, or system.

Our placement of the resources relative to each other, horizontally or vertically, is merely conceptual, based on insights from the literature. Given that this was the pilot phase of an exploratory study, we do not attempt to assess the degree to which each resource is more or less complex or more or less instrumental than another.

#### 4.1 Simple-utilitarian project management resources

Investments in physical, technological, and financial resources are valuable to a firm (Brush *et al.*, 2001). We consider all of the resources classified in quadrant 1 to be valuable. The resources are classified in this quadrant because they are tangible, discrete, and property based and because they are directly applied in the project management process. We categorized hardware, software, databases, information systems, project management methodologies, project management bodies of knowledge, and maturity models as simple-utilitarian resources. Organizational policies and procedures and project management templates are included in bodies of knowledge and methodologies, respectively.

As discussed in our prior publication (Jugdev *et al.*, 2007), throughout a project, technology (including hardware and software) is often used as part of the project infrastructure to help improve information and knowledge flow and assist in the decision-making process (e.g. project management information systems, knowledge management systems, and decision tools). Additionally, software such as Microsoft Project<sup>®</sup> or Primavera<sup>®</sup> is frequently used. We categorized physical tools and techniques as primarily simple-utilitarian based on their being tangible and because of their direct applicability in terms of use. These physical tools and techniques are readily available on the market so they are not rare and are readily imitable. Firms appreciate the merits of such tools and techniques, consider them valuable, and invest in them, so these types of resources do have organizational support.

Similarly, an investment in project management methodologies helps firms understand the steps to follow towards project success. Methodologies also provide guidelines and checklists to ensure that the practices are followed and that the right outcomes achieved. Firms develop their own project management methodologies, and many base them on the project management bodies of knowledge. Numerous consulting firms sell methodologies and related support services to clients. The methodologies are simple and utilitarian. Since such methodologies are readily available and imitable, they do not meet the VRIO criteria of rare and inimitable, even though they are valuable and have organizational support. Methodologies are, therefore, not sources of a sustained competitive advantage.

Globally, a number of project management associations (e.g. Association of Project Management<sup>®</sup>, Australian Institute of Project Management<sup>®</sup>, Japan Project Management Forum<sup>®</sup>, PMI<sup>®</sup>) have developed bodies of knowledge to guide practitioners (e.g. the PMI's<sup>®</sup> PMBOK<sup>®</sup> Guide) (Morris, 2001) (Project Management Institute, 2008). The bodies of knowledge are valuable and provide explicit standards on practice in the knowledge areas of time, cost, scope, quality, human resources, risk, communications, procurement, and integration (Project Management Institute, 2008). These books represent codified knowledge and emphasize the rationalistic view of project management tools and techniques (Morris, 2001). These resources are simple and utilitarian. The bodies of knowledge are valuable but far from rare. In fact,

they are readily imitable as evident by how similar the bodies of knowledge are between countries. As the bodies of knowledge do not meet the VRIO criteria, they are not sources of competitive advantage.

We also categorized process maturity models as simple-utilitarian resources. The models consist of five linear stages reflecting processes and practices that are increasingly more defined and repeatable. The maturity models represent a physical/technological resource and assess a firm's investment in tangible resources but not intangible ones (ESI-International, 2001; Hartman, 2000; Ibbs and Kwak, 1997, 1998, 2000; MicroFrame, 2001). Tacit knowledge is not a feature expounded on in the maturity model literature. In fact, the ability to imitate the maturity models is a feature that vendors highlight when they state that their models were created from best practice databases. An analysis of the project management maturity models to assess them against the VRIO framework found that at best, project management maturity models lead to competitive parity (Jugdev and Thomas, 2002).

We purposefully placed project management methodologies, bodies of knowledge, and maturity models in the order depicted. Our rationale is that, relatively speaking, methodologies are simpler and more utilitarian than bodies of knowledge and maturity models. In addition, project management maturity models are more complex than the bodies of knowledge and are used in practice to drive project management capability through their application within firms.

#### *4.2 Simple-instrumental project management resources*

According to the Brush framework, financial resources are simple-instrumental resources because they are tangible and can be used to obtain other resources. These resources were the only specific examples of project-level resources that fit this quadrant 2 in our assessment. These financial resources are valuable, but not rare or inimitable. They do not directly contribute to sustained competitive advantage, but can be leveraged to obtain or develop other resources that might be used to do so.

#### *4.3 Complex-utilitarian project management resources*

The participants were divided in the placement of four resources between quadrants 1 and 3 and we expect that these resources would fall into either quadrant 1 or 3 depending on their level of complexity. Examples of project management hardware, software, database products, and information systems that are complex-utilitarian category (quadrant 3) would be those that involve proprietary development, beyond commonly available tools, and/or customized functionality to address firm-specific data and information needs. These types of resources may involve decision rules based on company-specific knowledge. We, therefore, expect these resources to be both valuable and rare.

#### *4.4 Complex-instrumental project management resources*

In the literature review section, we distinguished strategic resources from resources in general as those resources that tend to be intangible, tacit, and knowledge based. We classify five resources in quadrant 4 that categorizes the complex-instrumental ones – decision-making tools, project management offices, individual knowledge, mentoring, and communities of practice. Investments in these resources are valuable to a firm (Brush *et al.*, 2001). These resources also involve organizational support.

In addition, these resources are rare and inimitable, primarily because they are knowledge-based and involve human dimensions (Eisenhardt and Santos, 2000; Wright *et al.*, 2001), and they involve formal and informal processes.

Decision-making tools are complex-instrumental as they facilitate and involve application of human knowledge and judgement.

Firms are increasingly establishing project management offices to coordinate the use of tools, techniques, and technology to support projects, ensure consistency of use, and provide training and guidance, particularly on troubled projects (Aubry *et al.*, 2007, 2008; Hobbs and Aubry, 2007; Julian, 2008; Rad and Levin, 2002). Project management offices reflect a coordinated and structured way of implementing tangible project management practices. In essence, a key function of a project management office is to communicate information. Project management offices are vehicles for the communication and coordination of project practices. Firms establish different kinds of project management offices whereby some are more structured and authoritative compared to others that are less formal and serve in a support function. Some project management offices undertake functions that are similar to communities of practice, which we discuss later in this section.

The list of 17 resources that our study participants had classified included personal competences, experience, skills, and aptitudes. We clustered these resources into a resource set labeled "individual knowledge". We placed individual knowledge higher on the diagonal than compared to project management offices because individual knowledge involves more of the intangible/tacit dimensions of knowledge as compared to project management offices, which that may be viewed of as involving more explicit knowledge and codified material.

Mentoring is a process involving interpersonal and social interaction. Often, firms establish mentoring programs, yet they leave to the two employees the actual details of how the relationship between a mentor and mentee are established and evolve to the two employees. Mentoring also occurs informally in many contexts. We placed mentoring higher on the diagonal as compared to individual knowledge, because it involves both explicit and tacit knowledge sharing between multiple individuals.

Beyond the tacit knowledge of the individuals in a firm and the types of knowledge that practitioners share in mentoring relationships, we consider the communities of practice to be the most complex-instrumental project management resource. Collectively held knowledge evokes the concept of communities of practice (Brown and Duguid, 1998; Wenger, 1998). Community of practice are structures that enable peer-to-peer learning among practitioners (Wenger, 2006). These communities involve the informal exchange of ideas, practices, tools, and techniques. As knowledge flows through social networks that connect people (Currie, 2003), a community of practice can be an engine for developing social capital (Lesser, 2000). Social capital is based on making connections with others, promoting durable networks, enabling trust, and fostering cooperation (Prusak and Cohen, 2002). Social capital is an intangible attribute of the relationships among members of a social unit (Portes, 1998). We suggest that communities of practice, social capital, and tacit knowledge exchange may not be widely supported because firms have so far tended to view the competitive advantage of project management as embedded in tangible resources.

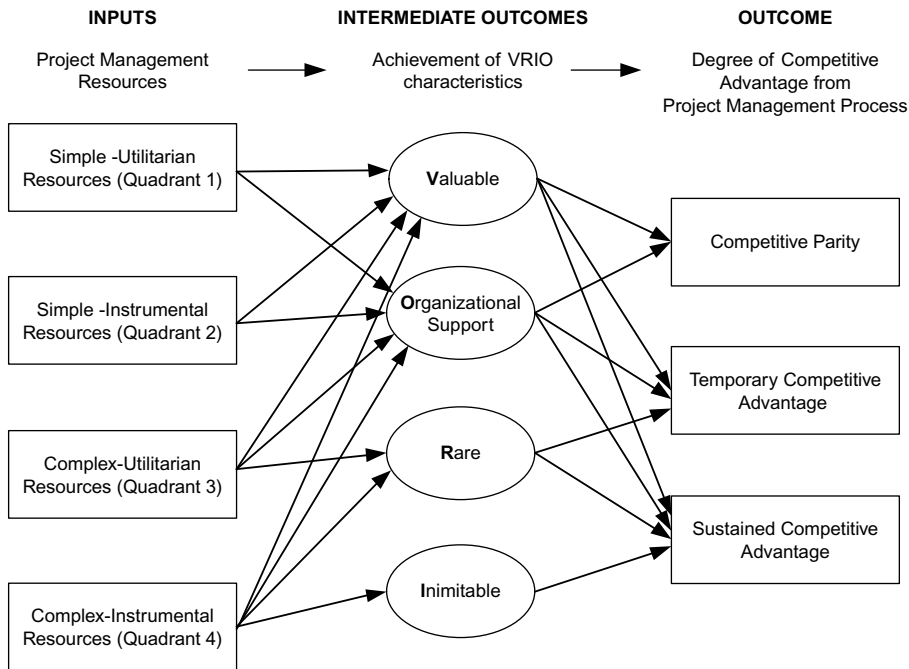
To date, as critiqued previously in the literature (Jugdev, 2007; Jugdev and Thomas, 2002) the majority of the project management literature has focused on explicit

knowledge as shared through project management offices, methodologies, and tools and techniques (Besner and Hobbs, 2004, 2006, 2008; Kloppenborg and Opfer, 2002; Ulri and Ulri, 2000; White and Fortune, 2002). The implicit, tacit, and social knowledge sharing practices within a project team, across an organization, and within a community of practice warrants further study. We posit, based on the RBV, that it is these complex-instrumental resources that are likely to be valuable, rare, and inimitable, and if they have organizational support, to be the source of sustained competitive advantage.

To summarize, even though classifying project management resources allowed us to conceptualize them as falling into all four quadrants of the Brush framework, it appears that a majority of these resources clustered in the simple-utilitarian category (quadrant 1) and the complex-instrumental category (quadrant 4). Some of the project-based resources seem to fit either quadrant 1 or 3, which was the complex-utilitarian category.

Based on our review of the literature, prior research (Jugdev *et al.*, 2007), and the findings from this research, we have developed a theoretical model (Figure 3) and propositions to link the different categories of project management resources to achievement of competitive advantage:

- P1. Project management resources that are simple and utilitarian (quadrant 1) will be valuable and have organizational support.
- P2. Project management resources that are simple and instrumental (quadrant 2) will be valuable and have organizational support.
- P3. Project management resources that are complex and utilitarian (quadrant 3) will be valuable, will have organizational support, and will be rare.



**Figure 3.** Conceptual model linking project management resources the VRIO characteristics of the project management process and competitive advantage

- P4. Project management resources that are complex and instrumental (quadrant 4) will be valuable, will have organizational support, and will be rare and inimitable.
- P5. The achievement of project management process characteristics that are valuable and have organizational support will lead to competitive parity.
- P6. The achievement of project management process characteristics that are valuable, have organizational support, and are rare will lead to temporary competitive advantage.
- P7. The achievement of project management process characteristics that are valuable, have organizational support, are rare, and are inimitable will lead to sustained competitive advantage.

Earlier in the literature review section of this paper, we made a distinction between competitive parity (achieved by having valuable resources), a temporary competitive advantage (achieved by having resources that are valuable and rare), and a sustained competitive advantage (achieved by having resources that are valuable, rare, and inimitable) (Barney, 1991). We also explained that as a firm transitions from competitive parity to a sustained competitive advantage, there is increasing evidence of organizational support in relation to these resources. In keeping with the RBV, we included the achievement of “organizational support” as a necessary outcome for all four resource types. The important implication for practitioners is that, while basic resources enable a firm to execute its business processes, it is the knowledge-based resources that are more likely to serve as sources of competitive advantage. The resources that fall into the complex-instrumental quadrant (4) are harder for rivals to mimic or duplicate because they are embedded in a firm’s culture and informal practices (Brush *et al.*, 2001; Eisenhardt and Santos, 2000; Ray *et al.*, 2004).

Our study has several limitations, being exploratory and at a preliminary stage in the development of a framework for classifying project management resources to consider their impact on competitive advantage. It has provided us with early insights and findings from which to extend this line of research, to gather richer and in-depth insights about strategic project management resources, and to elaborate the model and refine and validate the propositions. The methodology for resource categorization serves as a pilot, but calls for a more rigorous classification effort in a future phase of this research. We suggest that it would be useful for managers making investment decisions if the dimensions of complexity and leverage proposed by us, adapting the Brush framework for a project management resource, can be related to the strategic characteristics proposed by Barney’s VRIO framework. We believe that a replacement of the terms “utilitarian” and “instrumental” in the Brush framework with “direct” and “leveraged” would make it easier for practitioners to conceptualize the application of a resource to obtain or develop other resources. Our preliminary research also indicates a need to more clearly operationalize the terms “rare” and “inimitable” to determine the distinction between rare resources that are imitable and those that are not.

## 5. Conclusion

We believe that the RBV of the firm provides a useful lens with which to examine project management resources as a source of competitive advantage for a firm. We find that the



classification of project management resources based on their degree of complexity and level of leverage in the project management process can provide a useful framework for managers to make resource investment decisions with consideration for the impact of the investment on competitive advantage of the firm. Some resources are expected to be necessary to achieve competitive parity, others to provide temporary competitive advantage, and yet others to help a company with sustained competitive advantage. These advantages are expected to be achieved based on whether or not the resource creates value, is rare, is inimitable, and has organizational support. Our research suggests that managers should focus more attention on investing in project management resources that are likely to create sustainable competitive advantage. These are knowledge-based, complex resources that can be leveraged to obtain or develop other resources. While the more tangible resources such as hardware, software, systems, methodologies, and bodies of knowledge are indeed valuable, they are imitable and unlikely to create a lasting competitive advantage for a firm.

This paper is conceptual in nature and extends our prior empirical research to obtain more detailed classification of project management resources, beyond a one-dimensional consideration of tangible versus intangible assets, to a richer classification that considers degree of complexity and level of leverage in the project management process. We view this framework for classifying project management resources as a theoretical foundation for further discussion, elaboration, and modification through additional research in the field of project management. We intend to extend this work to a survey-based experimental study in order to elaborate the framework and test the propositions presented in this paper.

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124

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