

**DYNAMIC CAPABILITIES :
INNOVATION PROJECT PORTFOLIO MANAGEMENT**

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Abstract

Innovation Project Portfolio Management (IPPM) practices are a dynamic capability that provides competitive advantage by dynamically adjusting the organisation's portfolio of projects and resource allocation profile for the best innovation outcomes. A relatively new body of empirical research into IPPM practices is starting to generate findings related to IPPM practices and innovation outcomes. However this research is fragmented and lacks a unifying theoretical base. The resource-based view of strategy, in particular the dynamic capabilities approach, provides a theoretical framework to unify IPPM research. A 'processes, positions and paths' perspective on IPPM practices helps to clarify the ways that IPPM practices contribute to competitive advantage. Existing empirical research into the processes used for IPPM reveals some links to innovation outcomes, but does not try to explain causality. Improved understanding of the mechanisms responsible for competitive advantage through IPPM practices is found in research on positions (how IPPM processes draw upon and contribute to the underlying resource position) and paths (the role of past decisions and organisational paths in shaping IPPM processes as well as future options and decisions).

Keywords:

Project portfolio management, Innovation, Strategy, Dynamic capabilities, Resource-Based View, Exploration and exploitation.

INTRODUCTION

An organisation's innovation project portfolio management (IPPM) practices are responsible for the effective deployment of the innovation strategy. IPPM practices provide a holistic perspective for ongoing decision making to maintain the most effective combination of projects for new product and service development and to ensure that appropriate resources are allocated to the portfolio of innovation projects. This is an increasingly important area of organisational practice as innovation is essential for survival and growth in an increasingly dynamic environment.

The relatively new field of research into IPPM practices is fragmented and does not draw on a solid theoretical perspective or base. Strategic decisions about how best to spend or invest resources are central to organisational strategy (Teece, Pisano and Shuen, 1997) therefore the application of strategy frameworks to IPPM research can improve understanding. An organisation's IPPM capability is one of

the internal organisational capabilities or resources that an organisation uses to gain competitive advantage. Therefore, the resource-based view (RBV) of strategy presents a theoretical framework that is relevant to the study of IPPM practices. Classic RBV perspectives offer a model of organisational resources and advantages that is applicable to a fairly static environment; however innovation is by nature a dynamic organisational activity. Even in slow-moving industries, innovation is unpredictable and dynamic and requires an ever-changing mix of resources (Danneels, 2002, Tatikonda and Rosenthal, 2000, Zollo and Winter, 2002). The dynamic capabilities framework is a development of the RBV that identifies and focuses on the specific class of organisational capabilities or routines that provide advantages in dynamic environments. A dynamic capability can be defined as a “pattern of collective activity through which the organisation systematically generates and modifies its operating routines in pursuit of competitive advantage”(Zollo and Winter, 2002:340). Dynamic capabilities are ‘higher-order’ capabilities due to their ability to change other organisational capabilities (Winter, 2003). Organisational routines such as IPPM practices are a dynamic capability due to the role they play in the organisation’s ability to dynamically adjust its portfolio of projects and resource allocation for the best innovation outcomes.

METHOD

This paper begins with a brief overview of the evolution of strategic frameworks that emphasise internal organisational resources and capabilities. Dynamic capabilities are then discussed in more detail and IPPM practices are identified as a dynamic capability. The existing empirical research on IPPM practices is briefly outlined and then structured and analysed using the dynamic capability approach. Finally this paper shows how the dynamic capability approach enhances the understanding of the ways that IPPM practices contribute to sustainable competitive advantage and suggests some considerations for future IPPM research.

ORGANISATIONAL STRATEGY

External and Internal Perspectives

Strategic literature in the past few decades has been dominated by approaches focused on the external competitive environment and strategic conflict and positioning such as Porter’s competitive forces approach (Porter, 1980). This research focuses on the external factors in the organisation’s market and environment to determine the appropriate competitive strategies. This external focus on the environment does not fully explain why some organisations are more successful in these markets than others, and does not help organisations to understand how to develop sustainable competitive advantages (Teece et al., 1997). To better understand the organisational basis for competitive success, the Resource-based view (RBV) (Smith, Vasudevan and Tanniru, 1996, Wernerfelt, 1984, Wernerfelt, 1995) or core competency models (Prahalad and Hamel, 1990) of organisational advantage offer an internally focused framework. While acknowledging that both the internal and external considerations

are relevant, strategy theorists present differing views and arguments about which view is most appropriate to help organisations create and sustain strategic advantage (see for example Nelson, 1991, Porter, 1991). In practice the internal RBV approach and the traditional externally focused strategy models complement each other to provide a rich picture of the organisation within its environment.

Organisational resources include cognitive competencies as well as physical and technical assets. The RBV approaches focus on identifying and measuring organisational resources such as tangible assets, a loyal customer base, or experience and knowledge within the organisation in order to shape appropriate strategies. From the RBV perspective the overall ability of an organisation is “what it can do as a result of resources working together” (Grant, 1991:120). A significant aspect of organisational strategy is the identification, development and maintenance of the important organisational resources that underpin competitive advantage (O'Regan and Ghobadian, 2004). The RBV assumes that resources are not uniform across competing organisations and uses this heterogeneity to explain the differing organisational success rates. Resources that are valuable, rare, inimitable and nonsubstitutable form the best basis for sustainable competitive advantage by being difficult for other organisations to copy or acquire (Barney, 1991). Capabilities are a type of organisational resource that enables it to perform activities. For a capability to provide strategic value it must be better than competitors, valued by the customers and it must be difficult to replicate (Hubbard, 1996).

Dynamic Capabilities

A major addition to the RBV is the identification of ‘dynamic capabilities’ as a class of organisational capabilities that enable organisations to effectively respond to changes in the dynamic environments in which they compete (Teece et al., 1997). The dynamic capabilities approach focuses on the processes used in organisations to integrate, build and reconfigure their resources to compete in dynamic environments.

Dynamic capabilities provide resource-based competitive advantage, but they are different from the standard organisational resources in several ways. While resource-based competencies must be difficult to copy or imitate to provide lasting competitive advantage, dynamic resources are often easy to copy and acquire (Eisenhardt and Martin, 2000). Dynamic resources often show strong commonalities across organisations and industries allowing the identification of ‘best practices’. These practices may have evolved from different paths and may be transferred or acquired more easily than other firm resources. Dynamic capabilities enhance organisational competitive advantage (Teece et al., 1997), however they cannot add value alone, they do this through reconfiguration of the existing resource-base (Eisenhardt and Martin, 2000) and therefore can be considered an enabling resource (Smith et al., 1996). In addition, the relative ease by which dynamic capabilities may be copied or acquired limits their ability to independently provide lasting value. The presence of both dynamic capabilities as well as underlying

resource advantages that are valuable, rare, inimitable or nonsubstitutable is required for long-term competitive advantage in dynamic environments.

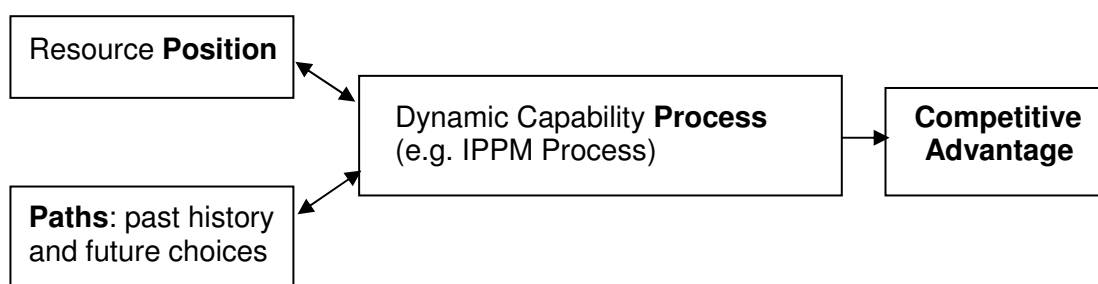
Dynamic capabilities require a sequential order for implementation (Eisenhardt and Martin, 2000). For example multi-project development is a dynamic capability that depends upon other capabilities being in place first such as single-project development capabilities and time-pacing capabilities that manage the connection between current and future developments (Brown and Eisenhardt, 1997).

Dynamic capabilities are “specific strategic and organizational processes like product development, strategic alliancing, and strategic decision making that create value for firms within dynamic markets by manipulating resources into new value-creating strategies” (Eisenhardt and Martin, 2000:1106). Processes like new product development (NPD) have not been considered as traditional areas for strategic research (Nelson, 1991), however there is a large amount of empirical research into NPD that has been conducted outside the strategy field (Ernst, 2002, Griffin, 1997). The identification of particular processes as dynamic capabilities enables these processes to be better understood by evaluating their role in altering an organisation’s resource base and the resultant effect on organisational performance (Eisenhardt and Martin, 2000). In addition, the existing research on these processes will add to the empirical grounding of the RBV and dynamic capabilities approach. Although the RBV and dynamic capabilities approaches were initially developed from an economic modelling perspective (Barney, 1991), an organisational activity-based perspective is most appropriate for the study of specific dynamic capabilities through empirical research (Eisenhardt and Martin, 2000).

Dynamic capabilities: Processes, Positions and Paths

A ‘processes, positions and paths’ framework captures the main aspects of dynamic capabilities (Teece et al., 1997). Although dynamic capabilities are essentially organisational processes, they depend strongly on the resource position of the organisation or the underlying traditional resource-base to generate sustainable competitive advantage as shown in figure 1. In addition, historical and future paths are important to the organisational decisions and learnings that form the basis for dynamic capabilities.

Figure 1: Dynamic Capabilities Create Competitive Advantage through Positions, Paths and Processes



Processes

Organisational processes range from static organisational routines to the ability of the organisation to learn new routines and patterns of activity. Organisational routines that enable organisations to transform and reconfigure resources when required are a particularly important dynamic capability.

Positions

The resource positions that underpin competitive advantage and dynamic capabilities must be deployed to the best advantage. Organisational resources can be tangible or intangible. For example, the technological assets, market knowledge and financial assets are part of the resource position of the organisation (Wernerfelt, 1984). Dynamic capabilities deploy, reconfigure and adapt these resources as required in dynamic environments.

Paths

Dynamic capabilities steer the organisation on future-oriented paths, but are also path dependent. Path dependency in dynamic capabilities is a function of the previous decisions made, knowledge gained and competencies developed that affect the current choices available. Current and future choices and paths are formed and altered by dynamic capabilities as an organisation moves forward in a dynamic environment (Lavie, 2006, Teece et al., 1997). The dynamic capabilities themselves evolve in a path dependent evolutionary fashion (Lavie, 2006). For example, organisational learning theory shows how decision-making processes evolve in response to the feedback and outcomes from previous decisions (March, 1991). This type of tacit accumulation of experiences (previous paths) together with the more deliberate learning mechanisms of knowledge articulation and codification are responsible for the evolution of dynamic capabilities (Zollo and Winter, 2002).

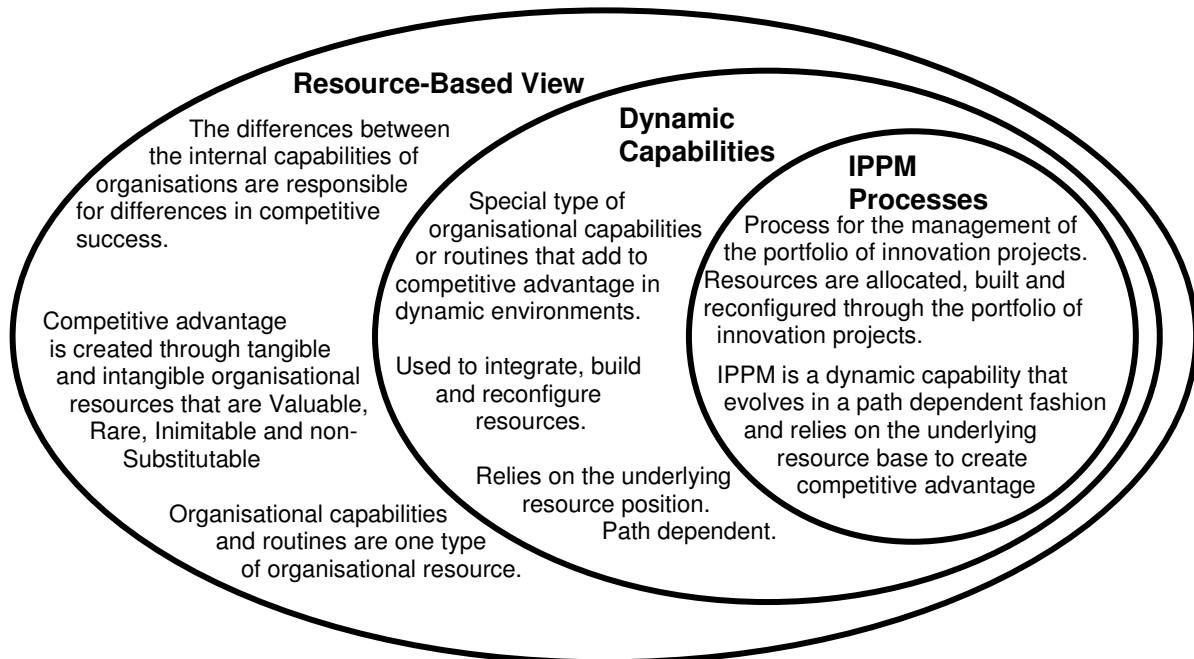
IPPM PRACTICES: A DYNAMIC CAPABILITY

IPPM practices are a body of organisational processes for the actioning of strategy that can be better understood using the dynamic capabilities approach of the RBV as shown in Figure 2. IPPM decisions are responsible for the alignment of projects with strategy, maintaining a balance of project types, and ensuring that the project portfolio fits with resource capability so that the organization can gain the maximum value from the investment in NPD (Cooper, Edgett and Kleinschmidt, 2001, Dawidson, 2004).

The effectiveness of an organisation's innovation activities through the NPD program is the main contributor to organisational renewal and survival in the dynamic competitive environment (Danneels, 2002). IPPM practices have the ability to alter the resource configuration of the firm through an ongoing and dynamic process of resource allocation and re-allocation to innovation projects. IPPM decisions determine which innovation activities an organisation will undertake and affect the longer

term development, acquisition and retirement of organisational resources to meet innovation requirements. Innovation activities draw on the existing competencies of an organisation while also helping to develop these competencies (Danneels, 2002).

Figure 2: Relationship between the Resource-Based View (RBV), Dynamic Capabilities, and Innovation Project Portfolio Management (IPPM) Processes.



IPPM practices exhibit several characteristics of dynamic capabilities. Similarities have been found among IPPM practices and innovation outcomes in a variety of industries across manufacturing and service-product based organisations indicating common areas of ‘best practice’ (Killen, Hunt and Kleinschmidt, 2008). IPPM is a dynamic capability that manages and allocates resources to create revenue-producing products and services, making the strategic choices that shape the innovation activities and outcomes of the organisation. IPPM therefore is not able to provide value to the organisation without an underlying resource base. IPPM processes also require that other capabilities such as project management capability (Martinsuo and Lehtonen, 2007) are in place before IPPM can be effective. Therefore IPPM practices align well with the identified aspects of dynamic capabilities and it is appropriate to use the dynamic capability approach to improve the understanding of IPPM practices.

Review of current empirical IPPM research and theoretical base.

There is no standard framework or theory behind most IPPM research other than a general proposition that some aspect of the IPPM methods used will have an effect on the resulting success of the

innovation program. One exception is an empirical study that includes IPPM within a theoretical framework examines the links between business strategy and project management (Milosevic and Srivannaboon, 2006). The framework classifies the business strategies in terms of the competitive strategies outlined by Porter (1980) and explores links with project management capabilities including project portfolio management processes. Several other authors also propose a variety of frameworks and processes for IPPM, outlining a series of steps and success factors for an IPPM process (see for example Archer and Ghasemzadeh, 1999, Archer and Ghasemzadeh, 2004, Combe, 1999, Stummer, 2003), however without further links to existing theories.

The empirical research on IPPM has focused largely on determining success factors or links between IPPM practices and successful outcomes. Almost all studies indicate that a standard IPPM process is not appropriate across different organisations, and that the process must be customised to suit the particular environment. For more detail and a comprehensive review of empirical research on IPPM, see Killen, Hunt and Kleinschmidt (2007a). While these findings represent a start in the development of understanding about IPPM practices and outcomes, the lack of a common theoretical grounding or framework limits their impact.

Existing empirical IPPM research as processes, positions and paths.

This paper has established IPPM practices as one of the dynamic capabilities that an organisation possesses that contributes to its competitive advantage. Improved understating of these processes can be gained by using the dynamic capabilities approach to evaluate their role in altering the resource base and improving organisational outcomes (Eisenhardt and Martin, 2000). The framework proposed by Teece et al. (1997) using parameters focused on processes, positions and paths provides a useful framework to examine existing IPPM research. The proposed research framework also draws on organisational learning theory (March, 1991, Zollo and Winter, 2002) to enhance the understanding of path dependencies and their effect on the evolution of IPPM processes. This structuring aims to add clarity by illuminating the relationships between the processes used for IPPM, the resource position of the organisation, and the paths or options available.

Processes

IPPM processes used in industry have strong commonalities, even between very different industries across manufacturing and service product development environments (Cooper et al., 2001, Killen et al., 2008). The identification of 'best practices' is a strong theme in IPPM literature and a number of benchmarking studies have been conducted to identify practices that are linked with improved business performance and the creation of sustainable competitive advantage (Center for Business Practices, 2005, Cooper et al., 2001, Jeffery and Leliveld, 2004, Killen et al., 2008).

The often repeated claim that more formal IPPM processes will lead to improved outcomes is supported by some studies (Cooper et al., 2001, Jeffery and Leliveld, 2004, Killen, Hunt and Kleinschmidt, 2006b) and challenged by others (Dietrich, 2006, Loch, 2000). Other studies identify the front-end activities that best link strategy to projects and highlight the importance of the inclusion of business models in IPPM decision-making (Poskela, Dietrich, Berg, Artto and Lehtonen, 2005, Reginato and Ibbs, 2006).

Empirical studies report mixed findings regarding the links between particular IPPM methods and goals. For example financial methods, although the most commonly used, are shown not to be best as a primary selection method due to poor portfolio performance outcomes (Cooper et al., 2001, Killen, Hunt and Kleinschmidt, 2006a). This finding is aligned with the view that the internal resource base of an organisation comprises a range of capabilities, and that a “balance sheet is a poor shadow of the firm’s competencies” (Teece et al., 1997:517). The use of portfolio maps and strategic methods are shown to enhance the balance and strategic alignment of the portfolio. Research reveals that most organizations feel that their project portfolio contains too many projects for the available resources, however existing research has not identified any IPPM methods that are associated with an appropriate number of projects in the resulting portfolio (Cooper et al., 2001, Killen, Hunt and Kleinschmidt, 2005).

Positions

Existing research that is focused on IPPM practices does not tend to evaluate the resource position of an organisation specifically. Most research approaches IPPM as a process to achieve strategic aims through a portfolio of innovation projects that are supported by finite resources. However, in-depth analysis of the relationships between strategy and projects reveals a two-way influence instead of the often cited one-way relationship where strategy flows downwards to drive IPPM decisions (Milosevic and Srivannaboon, 2006, Poskela et al., 2005). This two way influence includes an emergent feedback loop that can influence strategic directions by providing visibility to the relationship between the resources and the activities taking place in the organisation. It is through this type of feedback loop that organisations can better understand their resource positions and make decisions about adjusting the underlying resources to best meet the innovation goals of the organisation.

Paths

Strategic choices, future paths and path dependency are evident in two themes within the research on IPPM practices. One theme of research focuses on the evolution of the practices themselves and the other theme looks at the role IPPM practices play in shaping organizational paths. Past organisational experiences and previous choices and decisions influence both of these themes.

Research into IPPM practices regularly acknowledges the evolution and development of these practices within an organisation. IPPM processes are shown to be on an evolutionary path through maturity

models developed based on empirical 'best practice' focused research studies (Jeffery and Leliveld, 2004, Kahn, Barczak and Moss, 2006, Pennypacker, 2005, PMI, 2003). In addition, a majority of recent survey respondents place importance on IPPM and plan to increase or improve their IPPM efforts (Center for Business Practices, 2005, Dye, 2006, Kapur, Ferris, Juliano and Berman, 2006). While the use and awareness of the terms 'Project Portfolio Management' or 'Portfolio Management' are increasing, empirical research findings show that portfolio management maturity is still low and that the terms are not well understood or used in industry (Milosevic and Srivannaboon, 2006, Morris and Jamieson, 2005).

Existing research results also reveal the necessary 'order of implementation' or sequential implementation paths for successful IPPM. For example, several studies have confirmed the relationship between project management practices and IPPM performance and the requirement for project management practices to be established before IPPM implementations can be successful (Brown and Eisenhardt, 1997, Dietrich, 2006, Martinsuo and Lehtonen, 2007). A strong link is also shown between the importance placed on IPPM and the achievement of IPPM goals (Cooper et al., 2001, Killen et al., 2006a).

Effective IPPM practices are contingent on the particular environment in which they are used. Empirical findings on IPPM practices suggest that no single IPPM method will be appropriate for all situations, and that organizations need to customize their IPPM process to suit their environment (see for example Cooper et al., 2001, Crawford, Hobbs and Turner, 2006, Loch, 2000, McDonough III and Spital, 2003).

The role of IPPM practices in shaping organizational paths is reflected in some of the existing empirical research. Best practice surveys indicate that more established and formal IPPM methods are related to better alignment of the portfolio with strategy and higher value projects in the organisation's innovation project portfolio (Cooper et al., 2001, Killen et al., 2006a), however these surveys are not able to establish causality. Research also highlights the fact that obtaining a balance in the project portfolio is difficult to achieve and that the balance between incremental and radical or short and long term projects is one of the most problematic areas. A majority of organisations report that they have too many short term and incremental projects as an outcome from the IPPM process (Cooper et al., 2001, Cooper, Edgett and Kleinschmidt, 2004, Killen et al., 2006a). Organisational learning theory is used to explore the mechanisms used in decisions related to short term or incremental projects that 'exploit' existing capabilities compared with longer term or radical projects that 'explore' less established areas (March, 1991). Decisions to allocate resources to exploitation projects provide more frequent and rapid positive feedback to decision-makers than decisions to allocate resources to exploration projects, therefore a natural evolution of such decision-making processes will tend towards allocating resources to an

increasingly higher percentage of exploitative or incremental and short term projects. This type of path-dependent evolution of IPPM processes is observed in in-depth case studies, and organisations find that they must apply extra effort to manage their IPPM processes to ensure a balanced portfolio of exploration and exploitation projects (Killen, Hunt and Kleinschmidt, 2007b). Deliberate learning mechanisms such as knowledge articulation and codification can be employed to build the IPPM capability (Zollo and Winter, 2002) while addressing the need to balance the portfolio.

SUMMARY AND ANALYSIS

Following a RBV perspective, this paper has identified IPPM practices as a dynamic capability of an organisation that enhances competitive advantage through effective management of the portfolio of innovation projects. IPPM processes rely on the underlying resource position and the organisation's past and future paths to create sustainable competitive advantage. The application of the dynamic capabilities approach to existing empirical research on IPPM provides a structure to analyse the findings in terms of processes, positions and paths and to highlight the role IPPM has in shaping competitive advantage.

Empirical research clearly acknowledges the processes used for IPPM and is beginning to identify links between particular processes and successful innovation outcomes. These processes are identified as 'best practices' and although causality is not determined, these best practices are often adopted by organisations who are developing and implementing IPPM practices. In this way IPPM practices can be seen as relatively transferable to other organisations. This highlights the fact that IPPM processes must work with underlying resources that are more difficult to copy and acquire to provide sustained competitive advantage. It is the combination of IPPM processes working with the underlying organisational resources that creates a specific capability that is particularly unique (inimitable) and valuable to the organization.

The resource base that IPPM practices draws upon has not received as much attention in the empirical literature, however it is acknowledged that both internal resources and the competitive position of each organisation is unique, and that the IPPM process that is best for each organization needs to be customised to suit the situation. An important and under-explored area of IPPM research relates to the existence of emergent feedback loops through the IPPM process in shaping strategy (Milosevic and Srivannaboon, 2006, Poskela et al., 2005). Further exploration could determine whether and how such an emergent feedback mechanism has a role in developing the appropriate resource position of an organisation so that it aligns with and supports the innovation strategy.

Research shows that IPPM processes often develop and mature following common paths and patterns that can be viewed as maturity models. In addition, ordered implementation requirements such as the

prior establishment of project management capability are shown to be associated with successful IPPM implementation. Research in this area helps organisations predict and plan their IPPM practices, but again points to the relative ease by which organisations can copy or acquire IPPM capabilities in comparison with the underlying resource base.

IPPM decisions focus on the paths and choices available in the future through the innovation project activities undertaken and the resources allocated to support these activities. Research repeatedly shows that one of the largest challenges in IPPM practices is to find the right balance between short-term incremental projects that exploit existing capabilities and longer-term more radical projects that explore new areas. Organisational learning and path-dependency theories show how IPPM decisions tend to increasingly favour exploitation projects at the expense of the exploration projects that are essential for organisational innovation and renewal. Existing theory and research suggests that organisations that allow a natural evolution of the IPPM process will struggle with too many short-term, incremental ‘exploitation’ projects. This indicates that organisations must adopt deliberate learning mechanisms to consciously and explicitly determine the desired balance between exploration and exploitation efforts, and should design IPPM practices to achieve that balance.

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

The dynamic capabilities approach provides a framework to structure and evaluate research into IPPM practices. Existing research to understand IPPM practices and improve innovation outcomes has focused primarily on the particular methods and processes used. The dynamic capability approach highlights the fact that the processes used are only one mechanism by which IPPM practices can add to competitive advantage. As Teece et al. state, “the competitive advantage of firms lies with its managerial and organisational processes, shaped by its (specific) asset position, and the paths available to it” (1997:518). Analysis of existing IPPM research using a dynamic capabilities approach highlights the following lessons for organisations and suggestions for future research:

- IPPM practices exhibit commonalities and best practices across organisations and industries and are relatively easy for an organisation to copy or acquire compared with the underlying resource base. Therefore although IPPM practices are important for developing sustainable competitive advantage, they depend upon the underlying resource position to do this.
- IPPM practices have a role to play not only in allocating resources but in identifying the desired development and direction for the resource position in line with innovation strategy. Future research into IPPM practices will benefit from using the dynamic capabilities approach to explore the relationship between IPPM practices and the development of the resource base.

- The resource position and paths available to an organisation are continually changing; therefore IPPM processes need to be dynamic and responsive. Future research should acknowledge the temporal nature of the environment and may include longitudinal studies that track IPPM options and decisions, resource positions and innovation outcomes.
- History matters in IPPM processes. The paths taken in the past will affect the future choices available to the organisation. IPPM processes will naturally evolve to favour exploitation over exploration. Exploration projects are essential for organisational renewal and growth and for long-term survival; therefore organisations must be aware of this trend and make specific efforts to achieve the desired balance of exploitation and exploration projects.

In conclusion, the identification of IPPM practices as a dynamic capability provides a perspective to analyse IPPM practises. IPPM processes both rely on and influence the resource position of the organisation. Current decisions about the future paths available to an organisation are the focus of IPPM practices, however past decisions and options are important as they have shaped the current environment. A framework that analyses the processes, positions and paths provides enhanced understanding of IPPM practices and their role in developing sustainable competitive advantage.

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