

**DEVELOPMENT OF A BEST PRACTICES  
FRAMEWORK FOR NEW PRODUCT  
DEVELOPMENT IN SMALL TO MEDIUM  
ENTERPRISES**

John Nicholas, Ann Ledwith

Department of Manufacturing and Operations Engineering,  
University of Limerick,  
Limerick,  
Ireland.

Tel: 353 61 213271,  
Fax: 353 61 338171,  
[john.nicholas@ul.ie](mailto:john.nicholas@ul.ie)  
[ann.ledwith@ul.ie](mailto:ann.ledwith@ul.ie),

## **Abstract**

The successful development of new products and services is crucial to the long-term survival of business enterprises. With increased competition to the market place and shortening product life cycles pressure has been imposed on all enterprises to innovate more efficiently. This paper presents the development of an initial best practice framework for new product development (NPD) within Small to Medium Enterprises (SME's). The initial framework was developed based on Kahn's model (Kahn, Barczak et al. 2004; Kahn, Barczak et al. 2006) and an extensive review of currently recognised NPD Best Practises. The model was refined using the Delphi method with a panel of experts including academic personnel within the University of Limerick and various other professionals. In addition to refinement of the model the question of whether or not large and small companies can be examined using the same framework was posed to the panel of experts.

## **1.0 Introduction**

Current research and literature on best practises within New Product Development (NPD) almost exclusively focuses on the processes and practises used within large firms (Cooper and Kleinschmidt, 1995; Kahn, Barczak et al., 2006). However, according to the European Commission, within the enlarged European Union of 25 countries, 23 million SME's provide 75 million jobs and represent 99% of all enterprises. (Commission 2003). A best practises framework for New Product Development tailored for SME's would therefore prove invaluable.

The initial framework was developed using Kahn's model (Kahn, Barczak et al. 2004) and a broad review of the management of SME's (Welsh and White 1981; Ghobadian and Gallear 1997; Voss, Blackmon et al. 1998) as well as research into currently recognised NPD Best Practises (Cooper and Kleinschmidt 1995; Griffen 1997; Loch 2000). The model was refined using the Delphi method; a technique, based on a structured process used for collecting and distilling knowledge from a group of experts by means of a series of questionnaires (Adler and Ziglio 1996). For this research the panel of experts included academic personnel within the University of Limerick and professionals working on the Champions of Innovation programme, which, is funded by the Irish state-sponsored body Enterprise Ireland to encourage innovation in SME's in Ireland. Each professional has been involved for many years in innovation management and is recognised as an expert in their field.

### **The Why and How of Benchmarking**

Companies develop many types of new products ranging from radically new projects to minor extensions of existing products. A company's potential to successfully develop new products depends on the type of products they wish to introduce, the processes they use and their relationships with parties outside the company including competitors, customers, distributors and suppliers. Various factors have an impact on firms NPD potential. Some of the factors, identified in the literature, which potentially impacts the NPD of a firm, include:

- Rapidly changing market environment (Carlson 1994; Slattery and Nellis 2005).
- Increased Market Competition (Hayes, Wheelwright et al. 1988; Norton and Bass 1992; Lawrence 1993; Ilinitch, D'Aveni et al. 1996; Shepherd and Ahmed 2000).
- High rates of technical obsolescence (Norton and Bass 1992).
- Shorter Product lifecycles (Baynus 1994; Judge 1997).

In response to the dynamic environment in which firms operate various methods are employed to improve process efficiency and overall NPD effectiveness. Benchmarking which is defined as “the process of identifying, understanding and adapting outstanding practices from within the same organisation or from other businesses to help improve performance” (Cook 1995) is one method used. The use of Capability Maturity Models (CMM) to benchmark a company’s performance is of huge benefit (Camp 1998; Paulk 1998) as it evaluates performance and suggests direction for process improvement.

## **Maturity Models**

A Capability Maturity Model (CMM) is an organisational model, which describes using a number of levels or stages, the way in which an organisation manages its processes. Each maturity level is a well-defined plateau, which provides a foundation for the next level resulting in continuous improvement. A maturity model usually encompasses:

- A number of levels.
- A label for each level, e.g. initial level, optimising level etc.
- A broad description of each level.
- A number of Key Process Areas (KPA) for each level.
- A description of how each KPA should be performed at each maturity level.

CMM’s have been proposed for a range of activities including Quality Management (Quality Management Maturity Grid, (QMMG), Software Development Capability Maturity Model (SW-CMM) and Project Planning Maturity Model (PP-MM).

## **2.0 Best Practices within NPD Key Process Areas (KPA)**

The first step to improving a firm’s development process is an understanding of the critical success factors, which influence the success rate of new product development. A clearer understanding of these factors, which drives product success, allows a firm to focus their valuable R&D resources to the essential stages of NPD.

This section discusses these critical success factors as recognised in the literature. NPD best practices are discussed across 6 Key Process Areas (KPA) as defined in Kahn’s model (Kahn, Barczak et al. 2006): strategy, portfolio management, process, market research, people and metrics & performance evaluation. Each Key Process Area (KPA) is described across 5 levels of sophistication with each level corresponding to a particular set of characteristics describing: poor practice, (Level 1-Initial), improved practice (Level 2-Under Development), good practice (Level 3-Defined), excellent practices (Level 4-Managed) and best practices (Level 5-Optimized).

### **Strategy**

A firm’s NPD strategy defines the role new product development plays in the firm and must be closely aligned to the overall organisational strategy. A clear product development strategy allows management plan and allocate the necessary resources required to achieve the goals within the plan. A clearly communicated new product development strategy has been cited by various researchers as vital to excellence in new product development (Booz, Allen et al. 1968; Booz, Allen et al. 1982; Cooper and Kleinschmidt 1995; Pittiglio, Rabin et al. 1995; Martensen and Dahlgaard 2000). A benchmarking study by Cooper and Kleinschmidt

(1995) found several differences in the strategic plans between the “best” NPD performers and the “worst” NPD performers. The best performers were found to have; a clearly communicated strategy with long-term focus, well defined goals and clearly defined areas of strategic focus. The worst performers in comparison had a weak, poorly communicated, short-term strategic plan with no defined goals or specified arenas of strategic thrust.

## **Process**

Using a formal NPD process has long been cited as a differentiating factor between success and failure with in NPD (Booz, Allen et al. 1968; Booz, Allen et al. 1982; Cooper 1990; Zirger and Maidique 1990; Page 1993; Brown and Eisenhardt 1995; Griffen 1997a; Voss, Blackmon et al. 1998; Ayyagari, Beck et al. 2003). Zirger and Maidique (1990) found that new product success was greater when R&D was efficiently planned and well executed and when there was interaction and co-ordination between R&D, production, marketing and other functional groups. Voss, Blackmon et al. (1998) found the best performing firms were those who “developed more formal planning” while Brown and Eisenhardt (1995) concluded that successful product development is a result of “careful planning”.

Implementing a stage-gate<sup>®</sup>, type process may also lead to improved product success rates and the product being faster to market (Cooper 1994; Mercer Management Consulting Inc 1994). Cooper et al. (2002b) also found that progressive firms use the stage gate<sup>®</sup> process as a risk management model. A company may use a fast track process with fewer gates for low risk projects and utilised the full stage-gate<sup>®</sup> model to remain in control of larger high-risk projects.

Quality of execution of the process is also viewed as critical to project success (Zirger and Maidique 1990; Cooper and Kleinschmidt 1995; Cooper and Kleinschmidt 1996; Griffen 1997a). Zirger and Maidique (1990) concluded that product development is more successful if processes are planned and implement fully and project planning should include: “all phases of the development process; research, development, engineering, manufacturing, and market introduction”. Cooper and Kleinschmidt’s (1995) extensive benchmarking study revealed that the best NPD performers had a “high quality new product process” where there was a focus on quality of execution and the process was complete.

Pre-development work is viewed as crucial to the success of a NPD project. Researchers concur that the completion of “upfront homework” has a positive impact on product development (Booz, Allen et al. 1968; Booz, Allen et al. 1982; Kuczmariski & Associates 1994; Cooper and Kleinschmidt 1995; Cooper 1996; Langerak, Hultink et al. 2004).

## **Metrics and Performance Evaluation**

Unless a firm measures their NPD performance it is difficult to assess whether they are improving or declining in NPD performance. Measurement of NPD performance leads to improved product success (Cooper and Kleinschmidt 1987; Pittiglio, Rabin et al. 1995; Griffen 1997a; Voss, Blackmon et al. 1998; Martensen and Dahlgard 2000; Godener and Soderquist 2004). Griffin (1997) found that the best practice firms set formal financial objectives against which actual performance can be evaluated. This leads to higher expectations regarding NPD and thus an increase in NPD performance. Voss Blackmon et al. (1998) established that the best small firm performers in NPD were the firms, which were “systematically keeping performance data”. Godener and Soderquist (2004) concluded that measurement of NPD performance resulted in “better coherence and relevance of product

portfolios, reorienting projects before failure, deciding on corrective actions, supporting the launching decision, enhancing staff motivation, and facilitating well-balanced decision-making". Performance measurement is not something, which is done as a once during the development cycle but as continuous occurrence. The processes and performance need to be regularly and formally monitored throughout the life of the project (Cooper and Kleinschmidt 1987).

## **People**

The manner in which the personnel charged with the task of NPD are organised can influence the success of NPD. The idea of using cross-functional teams to develop new products as opposed to a department silo method has been supported by the majority of researchers (Little 1991; Page 1993; Brown and Eisenhardt 1995; Cooper and Kleinschmidt 1995; Pittiglio, Rabin et al. 1995; Cooper 1996; Griffen 1997a). Brown and Eisenhardt (1995) found that successful product development depends on the processes being implemented by "a competent and well co-ordinated cross functional team". Griffen's (1997) best practice investigation concluded that the best practice firm's use multi-functional teams more "extensively" than the poorer performers. Cooper and Kleinschmidt's (1995) in-depth analysis of best practises utilised by the "best" and "worst" NPD performers yielded valid and clear results regarding the use of cross-functional team players. Their findings demonstrate that the use of cross-functional team's in NPD result in a better performance especially if; every project has an assigned team of players, the team is cross functional, all projects have an identifiable and accountable team leader, the leader and the team are accountable for all facets of the NPD project — from beginning to end.

Visible top-level management is recognised as vital to success of any project, (Kuczarski & Associates 1994; Brown and Eisenhardt 1995; Cooper and Kleinschmidt 1995). Brown and Eisenhardt (1995) state that success is possible only "with the blessing of senior management". Cooper and Kleinschmidt (1995) conclude that product success will improve if senior management is strongly and visibly committed to the development of new products, devote the necessary resources, are intimately involved in key go/kill decisions.

Communication between the people and departments involved in NPD also effects product success (Keller 1986; Cooper and Kleinschmidt 1995; Voss, Blackmon et al. 1998). Voss, Blackmon et al. (1998) found the best small NPD performers were the ones who were "more open internally, paying attention to employee communication". Cooper and Kleinschmidt (1995) identify that high quality development teams require frequent meetings for efficient decisions and co-ordination.

The presence of a champion on a project team has been identified as a asset and important factor leading to project success (Chakrabarti 1974; Cooper and Kleinschmidt 1987; Markhan and Griffen 1998; Lee, Lee et al. 1999)".

## **Portfolio Management**

Portfolio management represents the screening out of product concepts to identify preferable concepts with which to proceed. Effective portfolio management is vital to successful product innovation (Griffen 1997a; Cooper, Edgett et al. 1999; Cooper and Edgett 2001a; Cooper, Edgett et al. 2004b). Several practices has been associated with good portfolio management by Cooper, Edgett et al (1999, 2004b) including maximising the value of the portfolio, prioritization of certain projects, seeking balance in the portfolio in terms of a number of

parameters e.g. long-term projects vs. short-term projects, strategically aligning your portfolio with the overall organisational strategy and having a formal systematic management system in place to select the correct projects and allocate necessary resources.

### **Market Research**

A firm's effectiveness in market information gathering, processing, sharing and use of market information plays a pivotal role in determining the success or failure of its new products. According to Zirger and Maidique (1990) it is critical that the firm “Understands user needs and effectively translates these needs into solutions for the customer”. A strong market and customer orientation, where the firm focuses on the needs and wants of the customer will result in more successful projects (Cooper and Kleinschmidt 1995; Martensen and Dahlgaard 2000). Effective market research particularly in the early stages of development results in sharp product definition (Cooper and Kleinschmidt 1995). There are two key stages to the early stages of market research prior to the beginning of development. The “scoping stage” which entails a preliminary market, technical and business assessment followed by “building the business case which involves a deeper study includes a user wants study, competitive analysis along with technical and manufacturing assessments. Incorporating these two key stages to the NPD process will result in sharper product definition, which is a critical success driver (Cooper and Edgett 2001a).

While it has been necessary to divide each of the best practices in the six separate KPA this does not mean that the practices apply to that section explicitly. Senior management for example is categorised in the people KPA however for NPD to be successful senior management support is required in every aspect of the process. Support is required for an effective strategy to be developed, for good portfolio management as well as in-depth market research.

### **3.0 Methodology**

The Delphi methodology is described as “a systematic method of collecting opinions from a group of experts through a series of questionnaires in which the feedback of the group’s opinion distribution is provided between question rounds” (Helmer 1972).

A questionnaire was developed containing exploratory questions regarding the framework and distributed with a copy of the proposed NPD Maturity Model to each member of the panel. Each KPA was allocated one page in the questionnaire. The characteristics were listed and a column entitled “PDR”. Which allowed the respondent “Promote...Demote. ...or Remove” the characteristic from that level. Space was also provided for additions to each level and general comments.

Open-ended questions were added at the end of the questionnaire to explore the following issues:

1. Can large and small companies be examined using the same framework?
2. If both large and small firms can be analysed using the same framework then does there exist a point on that framework that represents the optimal level for an SME or should the company be continually striving to reach the highest maturity level?

## 4.0 Development of the Model

### Strategy

Figure 4.1 presents the five levels of sophistication for strategy. Companies at Level 1 do not define any NPD strategy and have a short-term view of NPD. As a company matures to Level 3 the NPD strategy has been defined although it may still be vague in parts. The defined strategy is aligned with the companies overall strategy. Once they reach level five an SME has a clearly defined long-term strategy and organization wide awareness of the strategy and a company is continually reviewing and updating its NPD strategy to ensure it is in line with the organizations strategy and to reflect changes to the market place. A complete description of the characteristics from Level 1 to 5 can be viewed in figure 4.1.

Initial	Under Development	Defined	Managed	Optimised
No NPD strategy  Short-term view of NPD  NPD not recognised as being crucial to long-term survival of organisation  Availability of funding drives project selection	Unclear NPD strategy  Some NPD projects are aligned with NPD strategy but in general do not fit  NPD strategy not in line with overall organisational mission statement  NPD projects are identified during budget process and resources allocated accordingly	NPD strategy has been defined but may be vague in parts  NPD strategy mostly aligned with organisations mission statement  Most NPD projects are aligned with NPD strategy allowing a certain amount of flexibility  NPD strategy can be redirected in real time to respond to market forces  Organisational mission and NPD strategy drive NPD project selection	Clearly defined NPD strategy  NPD strategy clearly aligned with organizations mission statement  All NPD projects are aligned with NPD strategy unless they were approved by senior management  Quantitative goals for NPD  Strategic plan identifies arenas of opportunity  Market study is undertaken to guide strategic plan	Clearly defined strategy with organisational awareness of the strategy  Mission and strategic statement define strategic arenas for new opportunities  NPD strategy is continually being reviewed and updated to be kept in line with the organisations strategy and to reflect changes to the market place  Long-term strategic view of NPD

Figure 4.1 Key Process Area: Strategy

### Process

Figure 4.2 shows how a company develops its processes to move from Level 1 up to Level 5 on the maturity model. A Level 1 company does not have any process in place for NPD. As a company improves its processes it moves through level 2 and 3 to a position where formal processes have been installed. If further improvement occurs the company were to reach level five of the maturity model they are in the situation where one formal stage-gate® process is utilised across the entire organisation for the NPD process and the company is continually striving to improve its NPD process. A complete list of the characteristics from Level 1 to 5 can be viewed in figure 4.2.

Initial	Under Development	Defined	Managed	Optimised
No NPD Process exists  NPD is unorganised and ad-hoc  No NPD process owner  No project champion	Informal processes exist for some stages of the NPD process.  Process can be easily circumvented  No set process with different groups using their own processes  Little documentation exists  A project champion is vital to project success	Formal process exist for NPD and are utilised for most projects  NPD process documentation is available  Champions may play a role but are not critical to success  Idea generation is structured and formal  One individual can be clearly identified as the process owner  The development process addresses the whole the complete product cycle	Formal process exist for NPD and are utilized for every project  Stage-gate® process may be employed however the process or gates may not be clearly defined and may vary across the organisation  The NPD process is also flexible and adaptable to meet needs of individual projects  Time critical projects may skip stages of process  The NPD process is visible and well documented  There is an apparent NPD discipline	One formal stage-gate® process is utilised across the entire organisation  Go No-Go criteria are clearly pre-defined before each gate  Personnel are well disciplined in using to process to develop ideas  Organisation is striving to continually improve its NPD performance  Improvement of the process is the responsibility of management as well as the project teams

Figure 4.2 Key Process Area: Process

## Metrics and Performance Evaluation

Figure 4.3 portrays a continuum that ranges from a company having no standard criteria or metrics (Level 1) to a position where there are formal processes in place for evaluating projects and are used in most cases (Level 3) to a situation where there is a company-wide set of metrics used for every project (Level 5). Again the most mature level is when a formal stage-gate® process is utilized to evaluate the projects as they move from one stage of development to another. A more detailed breakdown of the characteristics can be viewed in figure 4.3.

Initial	Under Development	Defined	Managed	Optimised
<p>No standard criteria for evaluating projects</p> <p>No criteria for evaluating overall NPD effort</p> <p>Projects never killed</p>	<p>There are some general principals for evaluating projects however most are informal in nature</p> <p>Revenue is predominant metric for NPD success</p> <p>Performance may only be measured at the end of the project</p> <p>One person does all the evaluations</p> <p>Some projects may be killed</p>	<p>There are formal processes in place for evaluating projects and are used in for most projects</p> <p>Team approach is used to evaluate and make final decisions</p> <p>Projects can be killed at any stage of development</p> <p>Performance measured at various stages of the project</p> <p>Variables such as lead time, project schedule slippage are tracked for projects</p>	<p>Quantitative goals have been set for the company NPD performance</p> <p>Scoring models checklists are used to evaluate projects</p> <p>Senior management and project team responsible for projects evaluation</p> <p>Management must approve really new ideas or big projects</p> <p>Multiple review points exist</p> <p>Metric data is tracked and stored</p> <p>Metric data can be readily accessed for analyses</p> <p>Performance measured continually throughout duration of the project</p>	<p>There is a standard set of criteria for evaluation individual projects</p> <p>There is a standard set of criteria for evaluation of overall NPD effort</p> <p>A formal stage-gate ® process is utilised to evaluate the projects as they move from one stage of development to another</p> <p>There is a group charged with the task of evaluation</p> <p>Metrics are used to continually improve the NPD process</p>

Figure 4.3 Key Process Area: Metrics and Performance Evaluation

## People.

The people KPA shows the transition from Level 1 on the model where there is departmental silo organisation and NPD is performed by individuals to a point where NPD teams have been formed (Level 3) and finally to the situation the existence of cross-functional teams is the factor, which drives project success. Figure 4.4 shows a complete list of the characteristics.

Initial	Under Development	Defined	Managed	Optimised
<p>NPD is performed by individuals</p> <p>Individuals are unorganised</p> <p>No Project leaders</p> <p>Personnel take on too many projects</p> <p>No identifiable NPD team</p> <p>No training given to people involved in NPD</p> <p>Prevalent departmental silos</p> <p>“Over the wall” technique is used between department where one department completes their section of a project and passes it on without any consultation with other departments</p>	<p>NPD is decentralized within each department</p> <p>A champion may shepherd projects and are essential for project success</p> <p>Some people are employed full-time for NPD</p> <p>No NPD teams but personnel are employed from a range of different departments</p> <p>Little or no training given</p> <p>Creativity by people not directly involved with NPD may be stifled</p> <p>Management become aware that structure amongst the personal is important for project success</p>	<p>Departmental liaisons lead to established NPD teams (multifunctional team)</p> <p>Teams have regular meetings to discuss progress to discuss NPD project</p> <p>Each NPD project has a project leader</p> <p>Champions may exist but they are not necessary for project success</p> <p>Training given to people employed fulltime in NPD</p> <p>Personnel limit number of projects they work on</p> <p>Creatively within the organisation encouraged</p> <p>Team accomplishments recognised and rewarded when performance is exceptional</p>	<p>Cross functional teams under lie the NPD process and are vital for project success</p> <p>NPD is team-focused</p> <p>Identifiable new product managers within business department</p> <p>Clearly identifiable project leader who accept ownership of the project</p> <p>Not all projects required to go through project group: some may be handled by departmental manager</p> <p>Training given to people involved in NPD</p>	<p>Each project has a core team which remains on the project from beginning to end</p> <p>A NPD group exists and is purely dedicated to NPD work</p> <p>Project management software and techniques used to manage Projects</p> <p>Ongoing NPD training provided</p>

Figure 4.4 Key Process Area: People

## Portfolio management

Level 1 companies have no processes in place for portfolio management as seen in figure 2.5. As a company matures it reaches a point where Formal portfolio management processes are



in place and are utilized for most projects (Level 3). Finally once a firm has reached level five there is a formal and systematic portfolio management process in place with organizational awareness of the system. A company at Level 5 is continually reviewing their portfolio management process in effort to improve its success. A more detailed breakdown of the characteristics can be viewed in figure 4.5.

Initial	Under Development	Defined	Managed	Optimised
<p>No processes in place for portfolio management</p> <p>Portfolio management is responsibility of individuals</p> <p>No concern over types of projects being developed</p> <p>No projects prioritized</p> <p>No consideration given to Organisation mission/strategic statement when undertaking NPD projects. Projects may or may not be aligned</p> <p>Ability to secure funding drives Project selection</p> <p>No balance in NPD portfolio</p> <p>Pet projects are prevalent</p> <p>Projects are never killed</p>	<p>Some portfolio management process are in place though most are in formal in nature</p> <p>Management have realised importance of good portfolio management</p> <p>Financial techniques are only method used to assess a products financial return</p> <p>Some projects are aligned with the organisational strategy</p> <p>NPD projects prioritization occurs during budget process and resources allocated accordingly</p> <p>Pet projects exist</p> <p>A variety of projects supported with little regard to balance in portfolio</p> <p>NPD projects are reviewed individually</p>	<p>Formal portfolio management processes are in place and are utilised for most project</p> <p>Management are visibly involved in portfolio management</p> <p>Portfolio management is responsibility of project team and management</p> <p>Scoring techniques utilised to calculate a projects feasibility, risk strategic alignment etc</p> <p>Some projects may prioritized by senior management</p> <p>The organizational NPD strategy drives NPD project selection and thus most projects are aligned with the organizational strategy</p> <p>Attention is paid to the type and mix of products being developed</p> <p>Pet projects exist only if approved by senior management</p> <p>NPD projects are reviewed by category or type</p>	<p>Formal portfolio management processes are in place and are utilised for every project</p> <p>Resources can be made available should an opportunity arise on the horizon</p> <p>Mapping techniques may be used to assess feasibility of a project. These mapping techniques allow trade of between factors e.g. risk vs. profit</p> <p>All projects are aligned with the organisational strategy</p> <p>NPD projects are treated as one portfolio</p>	<p>A formal and systematic portfolio management process is in place with organisational awareness of the system</p> <p>A mix of techniques are used to ensure a prioritization of certain projects</p> <p>Keen consideration is given for balancing the number of projects and the available resources</p> <p>Organisation is continually reviewing their portfolio management process in effort to improve its success</p> <p>There is a balanced variety of projects in the portfolio</p> <p>An idea bank exists</p>

Figure 4.5 Key Process Area: Portfolio Management

## Market Research

Figure 4.6 presents a situation where an immature company at Level 1 does not undertake any type market research. By Level 3 formal organised market research of some form is undertaken for most projects. Once a company has reached Level Five they are optimising their research as they attempt to anticipate its customer's future needs through continuous market research. Figure 4.6 shows a complete list of the characteristics from Level 1 to 5.

Initial	Under Development	Defined	Managed	Optimised
<p>No market research performed</p> <p>No Customer/user input in NPD</p> <p>No concept testing, market testing of any kind is undertaken</p> <p>No studies undertaken to gain knowledge regarding market place</p> <p>Pet projects are prevalent</p>	<p>Management realise possible benefits of market research</p> <p>Market research is still ad-hoc and informal</p> <p>Market research is reactive in nature.</p> <p>Market research only performed in some cases</p> <p>Basic Market research is performed but only after a project has already begun</p> <p>Focus limited to current organisational needs</p> <p>Evaluation of actual research results are poor</p> <p>Research performed is generally secondary in nature</p> <p>Pet projects still exist</p>	<p>Senior management takes keen interest in market research.</p> <p>Market research is budgeted</p> <p>Market research used to develop product definition before project commences</p> <p>Market research more organised and formal in nature</p> <p>Market research more proactive in nature</p> <p>Market research of some variation is performed for most projects</p> <p>Some primary market research undertaken</p> <p>Qualitative research techniques are utilised</p> <p>Concept testing, product testing and market testing used in some projects</p> <p>Results of testing formally evaluated</p> <p>Go/kill/hold/recycle criteria exist based on market testing results</p>	<p>Product definitions are based on market research</p> <p>A formal market research function exists in the organisation</p> <p>Market research performed for all NPD projects</p> <p>Primary and secondary techniques are utilised</p> <p>Concept testing, product testing and market testing used in most projects</p> <p>Customers form an integral part of NPD process</p> <p>Strict Go/kill/hold/recycle criteria exist</p>	<p>Concept testing, product testing and market testing are consistently undertaken and expected in every projects</p> <p>Market studies are on going</p> <p>Market research is continuous process even after product launch</p> <p>Organisation attempts to anticipate customers future needs through continuous market research</p>

Figure 4.6 Key Process Area: Market Research

## **5.0 Results and Discussion**

While a full analysis of the questionnaire results is beyond the scope of this paper. The respondent's comments and suggestions to improve each KPA of the model are discussed as well as their opinions on the examination of large and small firms using the same model.

### **Strategy**

NPD strategy represents defining and planning a focus for the NPD efforts of the company. One comment made by a respondent was the words "goals" and "strategy" were used and interchanged throughout the KPA. As these represent the same thing the model should utilise only one to avoid confusion and ensure clarity. It was also pointed out that in the lower levels it is not the availability of funding which drives project selection rather "pet projects drive project selection". The setting of quantitative goals for NPD is another issue raised which the respondent's felt could be expanded across the levels into what type of quantitative goals are being set at each level.

### **Process**

Process represents the processes the company uses to move a project through for idea generation to launch. One respondent felt the role of "documentation" is hugely important to the success of a project and this was conveyed strongly through the process KPA but was lacking in the other KPA. They felt a documented process for performance evaluation and portfolio management in particular is vital. A contradiction within Level 4 was also noted by several consultants. The characteristics included that a stage-gate® type process may be employed but gates may not be clearly defined and may vary across the organisation. However also stated is that the NPD process is visible and well documented resulting in disagreement between the characteristics.

### **Metrics and Performance Evaluation**

Metrics and performance evaluation correspond to how NPD performance data is measured, reported and stored. The respondent's agreed that communication of the data is important for current and future project success. The theme of communication of the data is relatively weak across the 5 levels and needs to be addressed. Also having evaluations and multiple review points is important but the quality of these reviews is more important to ensure that weaker projects are killed. Another respondent pointed out that having data measured, stored and accessible for future projects does not mean that the data will actually be accessed and used by the team members so a discipline needs to exist at more mature levels to ensure employees are aware the data exists for use and draw on the available information.

### **People**

Several issues were raised by the respondent's regarding the people KPA. Firstly is the issue of co-location. One respondent through their research had found that if the people involved in NPD were located close together it had impact on project success. Being located close together resulted in more meeting and increased communication and awareness of the issues surrounding the project. They also raised the issue "generalist vs. the specialist". They had found that generalist was on to many project teams and did not devote their time evenly between the projects but only to the project they prefer to work on or been seen to be working on. However the majority of the consultants agreed that it rarely happens that an individual

limit the number of teams they are a part of. It was also cited by several of the experts that senior management support across this the KPA and in several other KPA's was not strong enough considering its huge role in NPD success.

### **Portfolio Management**

Portfolio management represents how a company screens its product concept to decide which concepts to proceed with. One respondent noted that their was slight variation between the portfolio management KPA and the strategy KPA regarding senior managements level of control of projects existing which are not aligned with the company's strategy showing a slight inconsistency between the KPA's. Several of the respondent's were also confused with regard to the treating of NPD projects are treated as one portfolio. This was intended to signify that when a project was being chosen the overall portfolio was consulted to ensure that balance would be maintained with regard to high risk vs. low risk projects, radically new vs. incremental projects etc. One respondent also had a general opinion regarding this KPA and whole model. Some items appear at lower levels and then skip a level and reappear at a more mature level. They suggested a "continuum of improvement across each KPA" e.g. the prioritization of projects is not mentioned in Level 4.

### **Market Research**

The main issue raised regarding market research by the respondent's was the customer's involvement. Customer involvement appeared at level 1 then skipped two levels and reappeared at a more mature level. It may be argued that during those levels market research is being carried out and market research usually captures the voice of the customer however for clarity and consistency in the model a continuum should be seen across all levels. Another respondent questioned that the model does not take into the consideration how radical products can evolve with out market research. Finally one respondent suggested the possibility to allow time for research after product has been launch. This gives time for research into technologies, which evolved during the development of the product and their applicability to the current product. The team is also held together for a period of time allowing in case there is an engineering change order (ECO).

### **Applicability of Model to Large and Small firms**

Whether or not both large and small companies can be assessed using the same framework was a key issue explored in the questionnaire. Out of the 6 returned questionnaires 3 respondent's thought it was possible and 3 respondent's thought separate models were required. Of those who thought it was not possible there was various reasons. One consultant stated "small companies are not large companies shrunk down; they need separate and distinct models and analysis". The same consultant even saw within the thresholds of the SME definition (Commission 2003) a need for two models as through their research companies with approximately less than 80 employees often has no defined departments. They thus saw the need for separate models to analyse small companies and medium sized companies. Another respondent saw "context as a crucial limiting which drives/challenges NPD. This context includes resources (financial, skill, time) which handicaps SME's". The fact that organisational structure is dependant on organisational size was raised by another 3 respondent e.g. "the decision cycle is much faster in small companies".

Those who thought it were possible they had various arguments. One respondent concluded that the NPD processes for a large and small firm “are the same even if the implementation is different”. Another respondent raised an interesting perspective. They thought the same levels and characteristics in principal would apply e.g. in a small company there may only be 1-2 people in an NPD team yet these could bring multi-functional thinking e.g. a technical person with marketing skills (Level 5- optimised) or they could be silo-thinking (Level 1-initial).

With regard to whether an SME should be continually striving to reach the highest maturity level or should they aim lower than level 5 all respondents except for one agreed that “all companies large and small, should aim for optimisation”. The respondent who disagreed concluded, “going to level 5 would not give a return proportional to the effort required to attain it”.

## 6.0 Conclusion

The proposed framework is an initial attempt at organising existing benchmarking data from published studies into a maturity model for NPD in small to medium enterprises. It was designed to initiate discussion amongst experts as to what represents “a best practice” to small firm. Initial findings have presented a wealth of information to refine and tailor the model for an SME. The consultants are divided as to whether or not the same model can be used to assess large and small firms. Kahn’s model is designed with large companies in mind and the fact that this model needs changing to suit a small company would suggest they cannot be assessed on the same model. Further investigation and an expansion of the Delphi panel should yield additional results allowing the completion of the framework.

## 7.0 Notes

1 Stage-Gate<sup>®</sup> process is a conceptual and operational road map for moving a new-product project from idea to launch. Stage-Gate<sup>®</sup> is a widely employed product development process that divides the effort into distinct time-sequenced stages separated by management decision gates (Product Development Institute Inc 2006)

## 8.0 References

1. Adler, M. and E. Ziglio (1996). "Gazing into the Oracle."
2. Ayyagari, M., T. Beck, et al. (2003). "Small and Medium Enterprises Across the Globe; A New Database."
3. Baynus, B. (1994). "Are Product life cycles Really Getting shorter?" journal of Product Innovation Management **11**(4): 300-308.
4. Booz, Allen, et al. (1968). "Management of new products."
5. Booz, Allen, et al. (1982). New Product Management for the 1980's.
6. Brown, S. L. and K. M. Eisenhardt (1995). "Product Development: Past research, present findings, and future directions." Academy of Management Review **20**(2): 343-378.
7. Carlson, T. (1994). "The Race is on." Brandweek: 24-27.
8. Chakrabarti, A. (1974). "The role of champion in product innovation." California management review **17**: 58-62.

9. Commission, E. (2003). "Commission Recommendation of 6th May 2003 concerning definition of micro, small and medium-sized enterprises." Official Journal of the European Union.
10. Cook, S. (1995). Practical Benchmarking - A manager's guide to creating a competitive advantage.
11. Cooper, R. G. (1990). "New Products: The key factors in success." American Marketing Association.
12. Cooper, R. G. (1994). "New Products: The Factors that drive success." International Marketing Review **11**(1): 60-76.
13. Cooper, R. G. (1996). What separates the winners from the losers. The PDMA handbook of New Product Development, John Wiley & Sons.
14. Cooper, R. G. and S. J. Edgett (2001a). "Portfolio Management for new Products: Picking the winners."
15. Cooper, R. G., S. J. Edgett, et al. (1999). "New product portfolio management: practices and performance." Journal of Product Innovation Management(16): 333-351.
16. Cooper, R. G., S. J. Edgett, et al. (2004b). "Benchmarking NPD Best Practices II." Research Technology Management **47**(3): 50-59.
17. Cooper, R. G. and S. J. Edgett (2006). Product Development Institute Inc
18. Cooper, R. G. and E. J. Kleinschmidt (1987). "New products; what separates winners from losers?" Journal of Product Innovation Management.
19. Cooper, R. G. and E. J. Kleinschmidt (1995). "Benchmarking the Firms Critical Success Factors in New Product Development." Journal of Product Innovation Management **12**: 374-391.
20. Cooper, R. G. and E. J. Kleinschmidt (1996). "Winning Businesses in Product Development: the critical success factors." Research Technology Management **39**(4).
21. Ghobadian, A. and D. Gallear (1997). "TQM and Organisation size." International Journal of Operations & Production Management **17**(2): 121-163.
22. Godener, A. and K. E. Soderquist (2004). "Use and impact of performance measurement results in R&D and NPD an exploratory study." R&D Management **34**(2): 191-219.
23. Griffin, A. (1997). "PDMA Research on New Product Development Practices: Updating trends and Benchmarking Best Practices." Journal of Product Innovation Management **14**: 429-458.
24. Griffin, A. (1997a). "PDMA Research on New Product Development Practices: Updating trends and Benchmarking Best Practices." Journal of Product Innovation Management **14**: 429-458.
25. Hayes, R. H., S. c. Wheelwright, et al. (1988). "Dynamic Marketing." The Free Press.
26. Helmer, O. (1972). On the future state of the Union. Memlo Park California, Institute for the future.
27. Ilinitich, A. Y., R. A. D'Aveni, et al. (1996). "New organization forms and strategies for managing in hypercompetitive environments." Organization Science **7**(3): 211-220.
28. Inc, M. M. C. (1994). High Performance New Product Development: Practices that set the leaders apart.
29. Judge, W. Q., Fryxell, G.E. and Dooley, R.S. (1997). "The new task of R&D management: creating goal directed communities for innovation." California Management Review
30. **39**(3): 72-85.
31. Kahn, K. B., G. Barczak, et al. (2004). "Establishing A NPD Best Practises Framework."

32. Kahn, K. B., G. Barczak, et al. (2006). "Establishing A NPD Best Practises Framework." Journal of Product Innovation Management **23**: 106-116.
33. Keller, R. T. (1986). "Predictors of the performance of project groups in R&D organisations." Academy of Management Journal **29**: 715-726.
34. Kuczmarski & Associates, I. (1994). "Winning New Product and service practises for the 1990's."
35. Langerak, F., E. J. Hultink, et al. (2004). "The role of predevelopment activities and the relationship between market orientation and performance." R&D Management **34**(3).
36. Lawrence, R. (1993). "Inside New-Product statistics: More or Less. New or not." Journal of advertising research **33**.
37. Lee, J., J. Lee, et al. (1999). "Differences of Organisational characteristics in new product development: cross-cultural comparison of Korea and the US." Technovation (20): 497-508.
38. Little, A. D. (1991). *The Arthur d Little Survey on the Product innovation process*, Cambridge. MA.
39. Loch, C. (2000). "Tailoring Product Development to Strategy: Case of a European Technology Manufacturer." European Management Journal **18**(3): 246-258.
40. Markhan, S. K. and A. Griffin (1998). "The breakfast of champions: association between champions and product development environments, practices and performance." Journal of Product Innovation Management **15**(5): 436-454.
41. Martensen, A. and J. J. Dahlgaard (2000). "Towards Innovative Excellence: A Danish Pilot Study on modelling and measuring innovation performance."
42. Norton, J. and F. M. Bass (1992). "Evolution of technological Generations: The law of capture." Sloan Management Review: 66-67.
43. Page, A. L. (1993). "Assessing New Product Development Practises and Performance: Establishing crucial norms." Journal of Product Innovation Management **10**: 273-290.
44. Pittiglio, Rabin, et al. (1995). "Product Development Leadership for technology based companies: Measurement and management- a prelude to action."
45. Shepherd, C. and P. K. Ahmed (2000). "From product innovation to solutions innovation: a new paradigm for competitive advantage." Journal of Product Innovation Management **3**(2): 100-106.
46. Slattery, D. J. and J. G. Nellis (2005). "Product development in UK retail banking developing a market-oriented approach in a rapidly changing regulatory environment." International Journal of Bank Marketing **23**(1): 90-106.
47. Voss, C., K. L. Blackmon, et al. (1998). "Made in Europe: Small Companies." Business Strategy Review **9**(4): 1-19.
48. Welsh, J. and J. White (1981). "A Small Business is not a big Business." Harvard Business Review: 18-32.
49. Zirger, b. J. and M. A. Maidique (1990). "A model of New Product Development: An Empirical Test." The Institute of Management Sciences.