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Competitive approaches to new product development

A comparison of successful organizations in an unstable economic environment

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Abstract

Purpose – The purpose of this paper is to provide practitioners of management with a sense of how collaborative team integration processes and new product development (NPD) processes were required in order to be reasonably successful in the current economic recession.

Design/methodology/approach – The four relatively large Pittsburgh-based general service and/or manufacturing-oriented companies, most with global operations and reach capabilities, were selected and reviewed for the principles of the strategic, financial, informational, and operational viewpoints.

Findings – Even conservative companies found that more radical approaches to NPD, such as product newness and uncertainty in new product innovation/production, may remove, not increase, barriers to incremental and/or radical manufacturability. This is especially true in firms that make proper use of the managerial connectivity provided by proper use of limited resources, which are enhanced by the timeliness of good strategies.

Practical implications – The roles of uncertainty, supplier influences, team integration processes, as well as technology, may act as change agents, especially under the current economic recession. These factors may result in leveling the playing field for incremental and radical innovators as they integrate processes associated with NPD.

Originality/value – The executive teams involved recognized the need for more radical product offerings by turning their focus to meeting customer needs instead of making risky investments. Through successful product implementation, the companies studied found stability in a very turbulent financial and service-oriented marketplace.

Keywords Case studies, Recession, Operations management, Product development, Quality, Services marketing

Paper type Viewpoint

1. Introduction to competitive environments

1.1 *New product design within its life cycle*

The roles of uncertainty, supplier influences, team integration processes, as well as technology may act as change agents, especially under the current economic recession. These factors may, in turn, serve to level the playing field for innovators as they integrate processes associated with new product development (NPD) and new product manufacturability (NPM) initiatives. A company's main purpose for existing is to provide goods and/or services to their customers. In order for a company to be

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successful they must choose goods or services in which they can establish a competitive advantage and differentiate themselves from their competition. A business can differentiate themselves in a variety of ways by implementing product strategies; for example of a product strategy is a low-cost strategy, by developing ways to make the product/service at a lower cost; the company can achieve competitive advantage by having the lowest price in the market. Another example of a differentiation strategy is rapid response. Companies that employ the rapid response strategy are generally quick to change their production and distribution techniques to meet ever-changing consumer demand.

Information and its associated technologies can be purchased and integrated into a company's infrastructure. The strategic value of such technologies is greatly enhanced when companies become information agile (Alexopoulou *et al.*, 2010; Althonayan and Sharif, 2010; Memon *et al.*, 2010; Patel and Hackney, 2010). It is the informational connectivity within the technical product team environment that may become a truly rare and valuable strategic asset. It is informational connectivity that also aids in the proper development of the firm's human capital as well. Specific product team integration characteristics in the technical innovation process may have common ties to product newness and speed parameters.

As suggested by Berggren and Nacher (2001, p. 92), "New product failure rates remain exceptionally high despite increasing efforts by academic and corporate researchers to develop new theories and approaches to reverse this trend". In terms of NPD and product introduction processes, "The conventional wisdom that has emerged is useful, but insufficient to improve success rates" (Berggren and Nacher, 2001, p. 92). Swink (1999) found that development team integration processes provided most of the explained variance in NPM. Therefore, NPM processes can be highly manageable since tactics that project managers might apply to reach desired levels of manufacturability have high probabilities of impacting NPM. Minis *et al.* (1999) discovered that significant attempts have been made to increase the awareness of manufacturing considerations among designers. Leading professional societies and many competitive manufacturing firms have published a number of manufacturability guidelines for a variety of production processes. Minis *et al.* recommended that the NPD teams should be required to select the partners that can manufacture the product most efficiently.

A very important aspect in the design of goods and services process is the understanding of the influences of the product life cycle (McDermott, 1999; Rasolinezhad, 2009; Summers and Scherpereel, 2008). It is the basic assumption of the present study that any product has a life cycle, each product has a limited life and their eventual sales pass through distinct stages, each posing different challenges, opportunities, and problems to the seller. It is further assumed that profits from these products rise and fall at different stages of the product life cycle, which requires management to develop and implement different marketing, financial, manufacturing, purchasing, and human resource strategies in each stage. The product lifecycle comprises four stages:

- (1) Introduction;
- (2) Growth;
- (3) Maturity; and
- (4) Decline.

The introduction phase is generally thought to be the most costly as it includes investment outlays for research and development, process modification and enhancement, and supplier development. During the introduction phase, customers have to be prompted to buy the product, therefore demand has to be created, with matching manufacturing capacity and efficiency occurs during the growth phase of the product life cycle. Operations managers ensure that they are meeting consumer demand for the new product. During the growth stage costs are reduced, sales volume increases, competition begins to increase, and there is more public awareness about the product.

By the maturity stage the product has competitors; therefore having low-cost and high-productivity is vital. During the maturity phase costs are very low, sales volume peaks, there is an increase in competition, and the products price tends to drop due to the abundance of competing goods. In general, after the maturity phase, a product will enter the decline phase in which it may not be profitable for the company to continue to manufacture this product. If this is the case, the product should be terminated.

In order to determine if a product should be terminated a company may conduct a product-by-value analysis. This analysis helps explain how much the product costs to make and how much revenue the product makes for the company. The company then decides what products to keep in its product assortment and which ones to do away with. Products have different life cycles; some can be profitable for years while other only days or weeks. Even before a product reaches the decline stage, businesses must constantly be establishing innovative products in order to maintain their competitive advantage. In order for companies to develop successful products it is essential that they understand their target consumer, understand the economic environment, and be in tune to sociological, demographic, technological, political and legal shifts in the locations in which they plan to manufacture and sell their products or services.

1.2 Quality-assurance initiatives

One way to determine what customers want and how to channel their wants into a product design is quality function deployment (QFD). According to Heizer and Render (2008), QFD helps translate customer needs into engineering characteristics for a product by prioritizing each product attribute while simultaneously setting development targets for the same product. The house of quality, for example, is a tool used by QFD and it is a graphic technique for defining the relationship between customer desires and the product or service.

There are many lean manufacturing techniques and strategies companies utilize to develop new products (Biswas and Sarker, 2008; Browning and Heath, 2009; Cavaleri, 2008; Chan and Kumar, 2009; Grewal, 2008). Some businesses may organize product development teams that are responsible for the new product from conception to getting to product in stores (Smith and Offodile, 2008). While developing new products companies can use robust design, modular design, computer-aided design, 3-D object modeling, computer-aided manufacturing, virtual reality, value analysis, to name a few. There are many similarities and differences in companies and in their manufacturing of goods and services. For example, within the case study portion of the present study, whether corporations such as Heinz is developing new condiments or PNC is developing new ways to bank online, there are similarities and differences between them in developing and promoting their associated product/service lines that are all based on customer satisfaction and support.

1.3 Purpose of the present study

The basic concepts for both manufacturing and service quality, for example, issues of delivery reliability and short response/cycle times are frequently cited in the literature. In terms of product quality, combinations of product design elements with durability and maintainability are common. As suggested by Finch (1999, p. 535), the definition that captures the essence of quality embodies those characteristics that precisely match customer desires:

This occurs through a combination of product design efforts and attention to conformance to specifications, both linked to customer needs. The need for customer-based information has prompted a variety of collection approaches that have evolved into what has become known as customer involvement.

This producer/customer involvement is evident in B2B as well as B2C transactions, as these markets have formal dialogue between customer and suppliers through the management of the supply chain. This is evident in the business partnering that has been commonplace in most businesses. For example, communication and information systems integration is a vital element of successful Customer Relationship Management (CRM) and the internet allows companies to easily reach millions of global customers at very low cost (Ifinedo and Nahar, 2009; Karjaluoto *et al.*, 2009; Shah *et al.*, 2008).

The goal of this paper is to inspect how different organizations are reacting to the recent economic crisis to maintain and possibly enhance the quality its product/service offerings, while looking at management's decisions through the well documented operational concepts of incremental innovation (improvement of pre-existing products) and radical product innovation (involving new technologies or ideas) processes in general terms. Much of the strategic product development literature suggests that these successful processes are largely supported by reliable information technologies, and good people (Santouridis *et al.*, 2009; Tripathi and Jeevan, 2009; Töremen *et al.*, 2009). These innovations or experiments may provide the foundation upon which the next generation of manufactured products may be made. According to McDermott (1999), firms that have large shares in one product generation may not be able to take advantage of the new wave of technologies and innovations and, thus, their existence may be threatened. This concept is especially true due the recent global recessionary environments that may companies must compete. The companies chosen for the case study represent a relative wide range of manufacturing and/or service organizations that allow for contrasting comparisons, from a large global food manufacturer to a large global financial services provider.

2. Case studies of product/service design and adaptability

2.1 Methodology

As the previous studies reviewed on the tactical and strategic importance of employee-based performance reviews in its various forms and its associated implementation problems, the author of the present study decided to review such measures from important representatives from the profit sector, especially in terms of more radical approaches to new product design and development. The four general service and/or manufacturing-orientated companies that were selected were Pittsburgh-based, most with global operations and reach capabilities, which were

within relatively easy access and can be reviewed for the principles of the strategic, financial, informational, and operational viewpoints. Such organizations are mainstream economic drivers of the Midwestern US and provided an opportunity to review a variety of service-related firms that closely linked its strategy with its service marketing of quality and its internal product/service design managerial approaches. In order to deal with any concerns about the research rigor and the source of explicit evidence base underpinning key concepts/ideas, so that the audience can adequately judge the value of the overall research findings, specifics of data collection are discussed in this section.

The basic research approach was personal interviews, with supplemental information from corporate literature and information available from the companies' web site. The exact number of interviews conducted varied from company, with PNC Financial Services having the largest number agreeing to be interviewed (23), followed by Heinz, North America (18), SuperValu (15), and Imperial Land Corporation with the least (6). Very general open-ended questions were asked concerning new product/service offerings, current project team integration issues and threats, and any specific information relating to current projects that management were willing to release. Unfortunately, as evident with any specific company case, the participants wanted to remain anonymous, and all interviewees were allowed to review the final manuscript to correct any discrepancies and to delete any information that they felt unfairly presented their companies. Basic Grounded Theoretical aspects were employed to factor the vast amount of qualitative data generated in order to triangulate key findings and common similarities among the various companies in order to spin a cohesive picture and cross-case thematic analysis.

While these firms are quite similar in nature and scope, especially in terms of its desire to serve its clientele, each firm faces unique challenges in utilizing its reputation for quality and expertise in a highly competitive and cost-sensitive environment, with significant consequences for getting it wrong in a recessionary economy (Hsu *et al.*, 2009; Kannianen *et al.*, 2009). Commonly established case study procedures associate with quality initiatives and improvements were followed in the present study (Nonthaleerak and Hendry, 2008; Sakkthivel, 2009; Smith, 2009a, 2009b).

2.2 Sample selection

The four relatively large organizations analyzed from a case study-perspective in terms of product design initiatives followed in the order of PNC Financial Services, a very large financial services company, Imperial Land Corporation, real estate development company in the Pittsburgh metropolitan area, SuperValu, a grocery wholesaler that provides all types of products for supermarkets all over the US, and Heinz, North America, a food manufacturer and distributor of iconic brands and relatively lesser known brands. A combination of personal interviews of upper to middle management, as well as comments from convenient samples of employees was used to gather perceptions of the accuracy of the various managements' perceived metric-based product design initiatives and the associated strategic initiatives that support their efforts for operational effectiveness and/or community acceptability. In essence, much of the factual information, not just personal experiences, was obtained either directly from management, or from the firms' web sites, or a combination of both sources.

The following sections begins with a brief introduction to its general operating environment is followed by sections describing its goals for implementing incremental and/or radical product design and related offers, and specific information concerning the construction and delivery systems of these systems. Discussion of the practical applications of lessons learned from the case studies follow these sections.

3. Company case studies

3.1 Case 1: PNC Financial Services (PNCFS)

3.1.1 Company description and background. PNC Financial Services (PNCFS) has proven to be a survivor during the current harsh economic times. The conservative approach by management, especially by CEO, Jim Rohr, has kept the bank afloat during the mortgage crisis that has caused many financial institutes to go under. PNC has been steadily acquiring troubled banks, with its biggest acquisition of National City currently in progress of full implementation. Management at PNC has taken great pride in assuring their employees that they are not interested in taking risks and would rather grow the business through smart investments. Employees have been communicated through email and intra-web articles from the CEO and other senior level managers on how the financial crisis has impacted the banking industry.

There have been growing concerns from employees when stock prices began to drop in January 2009 and when the 2008 fourth quarter earnings presented a loss. Management took the needed time to reassure their employees that this is not a sign of bad things to come. Instead, through open communication from management, explanations were given that due to the closing date of National City in December 2008, namely that projected earnings were expected to be lower. So although some employees naturally worry about the bank's long-term financial stability in a less than stable economy, the executive team is working hard to communicate the strong future that lies ahead through its current and future financial products/services offerings.

3.1.2 Product design emphasis. The near future of PNC will most likely be filled with phases of the National City acquisition. Instead of introducing new products/services, management will probably be more focused on taking the best products from both companies and delivering them to all customers using an incremental approach with the product life cycle. It was the introduction of new products that kept PNC at an advantage in a time where many banks were investing in sub-prime mortgages. Rather than focus on just one line of business, PNC looked to position itself in the market that would keep them competitive. Examples of this positioning strategy were new financial product offerings that were introduced in the last quarter of 2008. Perhaps one of the best ways to understand their product design process is to look at one of the newest product introduced before the announcement of the acquisition was made; management introduced a new service from their retail product forum to all its Pittsburgh-based customers from a more radical development approach.

This product was coined the term Virtual Wallet™ and was initially aimed toward the growing Generation Y demographic. This financial service is relatively innovate approach on how online banking is utilized by younger customers. In general, Generation Y customers consist mainly of those under the age of 30 and who grew up using the internet; there was a significant demand for a product that would serve their needs as an on-the-go, technology savvy generation and PNC was looking to develop a financial product to meet those needs. The first step to successful product design is

research as PNC brought in a third-party consultant, IDEO, to provide direction on the needs of the consumer (Helm, 2008). IDEO surveyed and studied the trends of Generation Y to determine what they are looking for in online banking.

One of the most significant developments was that many younger customers were unsure how to bank effectively, as many of the schools have abandoned vocational topics such as personal finance and book keeping for more traditional subjects, primarily as a cost-cutting step in operations as many school budgets are under serious financial stress. They can pay bills online, but they have trouble balancing their checkbooks. Generation Y has been severely lacking in promoting their savings for the long-term as many focused on their short-term financial goals. It was found that numerous times, younger customers have been especially penalized with overdraft fees because of overspending and lack of personal budgeting. One of the most interesting trends that were uncovered was that these customers frequently were very aware of what they spent, but often were not keenly aware of when they spent it. For example, when many customers sign up for automatic bill pay, their account is debited a set time every month. Younger customers were accustomed to the bills being paid, but frequently forgot to balance those payments and spent money too soon before other payments cleared. In essence, they needed a money management tool to help show them when they can spend and when to hold off until payments or additional income flow was acquired.

Management at PNC took this wealth of knowledge and created a product that is essentially a functional online money manager. It took approximately one year of research and development before the web site was launched in 2008, generally six months was spent on research, and six months on the design of the web site (Wolfe, 2008). This product design research proved vital to the success of the program because they incorporated much innovations and personal experiences into the final product offering. Virtual Wallet™ has many features that appeal to the online generation. Not only does it allow the customer to pay all bills online, but it only allows the consumer to write up to three checks for per month for free. This account encourages the customer to do many bill paying and saving activities online. There are three accounts to this product, namely Spend, Reserve, and Growth. These account names were terms used by Generation Y in the focus group studies. All of these accounts allow customers to monitor their money and freely move it from one account to another. There are also other benefits that are a direct response to young customer demands; such as a benefit nicknamed “punch the pig” – which is an instant savings tool that allows a customer to add money to their “piggy bank”. Management at PNC took considerable time and effort to make sure they created this program in a style and language that younger customers can understand. Another benefit is the warning signs or “danger days” where it alerts when payments are running low. Such features allow customers to synchronize these messages to their cell phones so they can receive text message alerts about their financial situations.

These and many other benefits were exactly what young consumers were looking for from a more radical product offering, and the extensive research, development, and training delivered by management has made this product a success right from the start. Joe Guyaux, President of PNC Retail Banking, expected this \$15 million product to break even within two years (Helm, 2008). In the banking world, this is considered a good turnaround, since many new branches can take three to five years before they can be deemed successful. It was the efforts that were put into the new product design that lead to its success.

When Virtual Wallet™ was ready to launch, much effort was placed in the various training and development sectors of the organization, resulting in a workable training strategy to get everyone on board. New product process doesn't end when the product has been developed. There are several more steps that end out the design process that are necessary for a successful delivery, as the training that went along with Virtual Wallet™ was extensive. It was imperative that all employees in the retail sector understood the product's applications before they can answer customer questions. There was on-the-job and computer-based training sessions that allowed retail employees to interact with facilitators and online tools. This training allowed for questioning and evaluation of how the product may be received. From these training sessions, FAQs were developed for both customers and PNC employees. Virtual Wallet™ can be a complex system to those that are not familiar with online bill paying, so it is important to make sure the employees know and understand the complexities of the system. Management allotted sufficient time for training to successfully implement their strategy and get all retail employees on board for the new product.

Although Virtual Wallet™ is in the early stages of the product life cycle, it has started off successfully and with the proper support tools in place. The reception to this product has been positive and the number of new accounts continues to grow daily. It was the in-depth research, design, development, and training, via NPD and team integration approaches that have made this product a thriving addition to the PNC line of products. PNC's new product design process has made the company grow and remain stable in this economy. It has proven time and again that their investment is serving the customer needs places PNC among the top banks in the US in terms of financial services; thus allowing the company to weather the current economic recession very well, unlike many of its banking counterparts. It was fortunate for PNC employees that the executive team recognized the need for more radical financial product offerings by turning their focus to meeting customer needs instead of making risky investments. As long as PNC continues down this road of successful product implementation, they will stay a strong force in the financial services market.

3.2 Case 2: Imperial Land Corporation (ILC)

3.2.1 Company description and background. Imperial Land Corporation (ILC) is a relatively real estate development company in the Pittsburgh, PA metropolitan area. The company owns approximately 5,500 acres of vacant land in Allegheny and Washington Counties, most of which was undermined in the 1930s and 1940s. The excess coal from these deep mines was then removed in the 1970s and 1980s, leaving large tracts of reclaimed land. The hope was that there would eventually be a market for this type of reclaimed land; in this case vacant, developable land, that users and developers would be interested in buying from the company now that the coal was mined and mineral rights no longer valuable.

3.2.2 Product design emphasis. It became clear that the customers wanted developable tracts in close proximity to the Pittsburgh International Airport and other major transportation routes. They needed accessible sites that were configured appropriately, affordable, and that had utilities such as water, sewer, electric, communications and gas. Initially, it was evident that while Imperial Land had property, it did not have a finished product that would attract customers to the area or region. The first step towards accomplishing the goal of having a saleable property

was providing access to utilities and marketable amenities. Unfortunately, the properties were not close to any major roadways or highways, and thus not attractive to the warehouse and distribution companies for which it was suited. Management at ILC began to work with local politicians, lobbyists, county and economic development organizations, engineers and, most importantly, the Pennsylvania Turnpike Commission in order to construct a portion of the Rt. 576 or Southern Beltway across a portion of the ILC property. After years of planning, design, and right-of-way acquisition, the seven-mile stretch of highway connecting the Pittsburgh International Airport at Rt. 60 to Rt. 22 was completed. The route was chosen carefully to minimize spending and provide the most favorable access to promote development of the properties available in the area. A major interchange, now known as the Westport Interchange, was constructed in the middle of ILC's property providing excellent access.

Once the accessibility issue was solved, but there still needed to be utilities at the sites. Electricity and communications were available, the other necessary utilities needed to be provided. Water and sewer lines were located almost three miles away. ILC and the Findlay Township Municipal Authority laid out an appropriate route to extend these utilities to the interchange area. The Authority's engineers designed the system so that the sewer lines would gravity flow all the way to the treatment plant. This had to be done with minimal earthwork in order to make the project economical, thus making the route selection extremely important. A site for the necessary 1.5 million gallon water tank, which was needed to service the area, was chosen at the highest point in the region owned by ILC, and the tank was constructed providing the newly installed water lines with the necessary pressure.

The gas service for this project fell solely on ILC. Two options, both lines consisting of 1.5-2 miles of pipe, could be extended to service the region. ILC worked with its engineers and landscape architects to put together a master plan on how the region may best layout for future development and property sales. In order to maximize property values, the most cost effective and convenient service line would have to be chosen. While one natural gas service line was found to service 1,800 acres, a second source and route would service nearly 3,000. The latter was chosen and installed, providing the region with everything it needed to be marketable.

Initially, management at ILC envisioned selling large tracts, 200 to 300 acres of land, to developers who would then construct business or industrial parks where buildings would house office, flex, and warehouse users. It was at this point that the economic downturn began and the banking industry became significantly more cautious with their real estate lending, typically known as the credit crunch. This limited the market of potential purchasers, as even established development firms were no longer able to attain the funds necessary to plan and develop a large tract of vacant property which had no income production for the first several years. After researching the market with ILC's real estate and planning consultants, it became clear that ILC would have to venture into real estate development alone by self funding its own project. A 300-acre parcel was chosen for development of an industrial park that would accommodate light industrial users looking to purchase property. Several months of planning was completed to lay out the first phase. Important steps were taken to decide the best layout for the access road, access to utilities, placement of the storm-water management system and other features. The project had to be designed in a way to

maximize the usable acreage of the site by placing ponds and roadways in ways that left large usable lots for purchase. Many of these features also had to be designed and sized accordingly to accommodate future phases of development.

Research was also conducted into what type of market this park would be catering to. It was found that the best way to maximize demand for the lots to be created would be to lay everything out in a way that provided 8 to 20 acre lots for potential buyers. Anything less than that was too small for warehouse and distribution companies, and anything larger was very rare, especially in the Western Pennsylvania market. The planned layout and design did leave flexibility to ILC to modify the future direction of the roadway and improvements, thus leaving the ability to accommodate for larger requirements should the real estate market in the region change.

To date, the new product development process has been a success at considerable time and effort. Recently, Lots 1 and 2 were sold, while Lots 3 and 4 are receiving a great deal of interest. This goes against the trend across the country where commercial property sales are down as much as 70 percent in some regions. If Lot 3 or 4 is sold, the company will have recouped all of its initial costs associated with the project, and the proceeds from the next three lots will be expressed in profits. ILC also has a neighboring 100-acre tract under agreement that will require zero financial investment on ILC's part, thanks to the prior regional access and utility planning, designing systems that would service this site as well as many others.

This new product venture, specifically developable and saleable land, has given ILC a tremendous competitive advantage. In the airport area, where many companies are now beginning to relocate, ILC is one of the few property owners who can provide shovel ready sites with all infrastructures in place, a required consideration for any future projects to be funded by federal stimulus money. In addition, ILC is one of the few land owners in a position to sell property in the region, so any companies wishing to own their land and building have to consider the various ILC sites. The main competition in the region comes from the Airport Authority who also owns several thousands of acres. The difference is that this property was purchased with Federal Aviation Authority funds, and cannot be sold. These properties can only be leased to prospective tenants, giving ILC a strong position in the "sales" market. In addition, ILC has been able to get ahead of the other competitors offering similar product in the region by using prior sales proceeds to fund its projects. Developers who are reliant on bank financing have seen their projects stall, thus missing out on prospective tenants. Management at ILC has been able to capture this market for the time being, and is now gaining profits that can be used for future phase design and construction, thus keeping the company ahead of the game in terms of inventory and ability to accommodate future prospects.

3.3 Case 3: *Supervalu*

3.3.1 Company description and background. Supervalu is a grocery wholesaler that provides all types of products for supermarkets within the domestic market of the US. The company has been providing services to the commercial food industry for over 135 years and has established itself as one of the nation's leading grocery retailers. Supervalu's large nationwide network spans approximately 2,500 retail stores and represents a full range of grocery retailing formats. In essence, Supervalu provides grocery stores with dry, frozen, and dairy groceries on a daily basis to all of its ordering companies in a timely efficient manner.

The greater Pittsburgh area Supervalu located in New Stanton, PA warehouse distributes tens of thousands of items through over 100 loading docks on a daily basis. Supervalu operates under a closed shop union regulation employing loaders, selectors, and inventory clerks. Although many of the operations are conducted along the same lines as many other warehouses, management at Supervalu does, in fact, employ a highly beneficial and intensive new product design and development methodology. Although they do not produce their own products, they do go through extensive methods to ensure the products they use in their warehouse are the most technologically advanced and technology sound equipment.

3.3.2 Product design emphasis. With a company like Supervalu, that handles enormous quantities of product, it is important to their survival to take all precautions and analyze every potential management decision very carefully. That is why they go to great quality assurance and lean management techniques to ensure quality and efficiency in their methods. Although the means for their NPD processes is relatively generic, their means of research and dedication is much more than generic and is extremely extensive. Since so much product moves through the warehouse everyday they must have a high level of confidence that they are maintaining quality levels and performing their operations as fast and as safely as possible, while reducing their costs in a very competitive environment. The recent economic downturn has made this situation and related managerial decisions even more critical. If the most optimal methodology is not used, the company can suffer extensive monetary and personnel waste and loss.

Management at Supervalu tries to utilize NPD processes, especially in its inventory tracking tactics. In the past, traditionally inventories and related order selection was accomplished completely by hand; and had operated under this method until the late 1980s, when management sought a new inventory management system that was more efficient and effective manner for work completion. Realizing that handwritten methods were reaching the decline stage in the product life cycle model, Supervalu decided to search for a more innovative operational approach. This search led them to the company known as Vocollect, a global company located in Pittsburgh that is noted for its voice-activated warehouse automated systems which utilizes listening and verbal methods for communication.

Vocollect was established in 1987 with products that were at the introduction stage at the lifecycle curve and was exactly what management at Supervalu desired. Although only a few stores originally began implementing the new equipment, others soon followed suit. Vocollect's growing popularity among other warehouse-operated organizations, along with Supervalu's own success, helped increase Supervalu's utilization of such products. Although worker skepticism was predominant at first, as time went on and the product entered the growth stage in the lifecycle workers became more accepting. As the time of present study, the Vocollect system is currently still being implemented, with over two decades of existence, the products are nearing the end of the growth stage and leaning more towards the maturity stage in the cycle. However, still very effective in the workplace, the Vocollect models have been updated over the years and continue to allow the workplace to run smoothly and efficiently via incremental improvements. Recently, the newest more radically designed models have been bought from the company, but with mixed reactions by the workers this may leave the door open for new products in Supervalu's inventory department.

Another product that recently went through the production design at Supervalu dealt with the processes of how the products are transported throughout the warehouse and how they are loaded on the trucks. In the past, there have been a number of different approaches for moving material within the warehouse, the first being the hand held and hand-powered pallet jack. This equipment general took longer time and was strenuous on workers, but due to past restrictions on available technology, it was the best option. After new technology was available, the company then improved on the powered single pallet jack, which, in turn, helped improve efficiency. It allowed less strain and fatigue on the workers and it improved the speediness of order completion. Then the powered double forklift was brought into the warehouse, which was used until recently. After extensively researching the market, the company decided that a new model was what was needed which was created by the CROWN Company. This new model that had been introduced not only used less battery powered, but it was easier to drive and its best feature was that it was considerable faster. This feature led employees to be able to finish jobs much fast and easier than before. This in turn led the company to be able to move product faster and save money by not having to have employees work the same hours in the past. By acknowledging the fact that the old pallet jacks had sunk to the declining part of the product life cycle it allowed the company to move forward with a well researched solution that ultimately led to a significant increase in production.

Although it is very important for all companies to make sure they have well researched and efficient methods in determining the new products for their businesses, management at Supervalu follow a more incremental approach, relying on normal evolutionary developments in existing technology. Such incremental approaches make sense in a high volume, low cost provider such as Supervalu. Production management deals with the creation of goods and services and the nature of this creation has dramatically changed in the last few years. The actual activities of creating goods and services take place throughout the organization of both primarily goods and service providers. Typically, in manufacturing organizations those creation activities are quite obvious. However, the widespread use of the internet and AIDC-related technologies, coupled with their general acceptance by consumers, has greatly altered the landscape of manufacturing and related service industries. The internet and AIDC-related technologies are significantly changing the way people shop/buy and manufacture. Management at Supervalu are exploring the use of such techniques, such as RFID tags, both active and passive, improvements in direct B2B communications, EDI, coupled with appropriate AIDC-related technologies creates an exclusive on-line channel among suppliers and/or manufacturers and buyers. Such technology investments provide up-to-date information and allow the supplier and buyer to conduct transactions, such as billing, ordering, and invoicing through secure lines of communication using standardized electronic documents.

3.4 Case 4: Heinz North America (Heinz NA)

3.4.1 *Company description and background.* The H.J. Heinz Company has been in the business of providing relatively common foodstuff for nearly 140 years. The North American portfolio consists of good balance of iconic brands and relatively lesser-known brands. Heinz Ketchup is the overwhelming leader in its category, enjoying some of the strongest brand recognition and loyalty in the industry. While the

association with the organization is much less apparent, powerful brands in their own right (such as Jack Daniel's, TGI Friday's, SmartOnes, Classico, Lea and Perrins, Ore-Ida and Boston Market) are helping pave the way for future growth in the organization.

Like any organization, Heinz's ability survive in the increasingly competitive landscape is contingent on its ability adapt and evolve, in relation to the ever changing needs of consumers and customers, including retailers, operators, and distributions. This adaptation requires an on-going dialogue with consumers and, in the case of food service establishments, which Heinz also conducts business with extensively, related to all moments of truth. Whether that be understanding advertising effectiveness, retailer shelf-sets, category convenience drivers, each detail requires dedicated resources of its marketing, marketing research, R&D, packaging, customer marketing, supply chain, finance, demand planning, category development departments when an organization operates on such a large scale.

3.4.2 Product design emphasis. In the case of NPD, the process is particularly and necessarily rigorous. Perhaps to best illustrate just some of the steps involved, the recent addition to the condiments and sauces portfolio, namely the Lea and Perrins Thick Classic™ (L&P) brand was chosen. Lea and Perrins brand is the number one brand of Worcestershire sauce, and has been around for over 170 years. Its primary usage occasion is as an ingredient, usually on burgers, meatloaf, and various related recipes. The base brand enjoys loyalty among a strong set of consumers yet its primary usage limits consumption and reach. Clearly then, to extend to brand listening to the "voice of the consumer" was necessary.

The NPD team began this project like many others, namely operating a number of focus groups to find out consumer preference. Before listening to the consumer, they needed to know who their target consumer was. This was accomplished with secondary research, data mining via leveraging in-market sales data and demographic panel data to understand what the demographic profile of the target consumer looks like; depending on the project this target consumer can be lapsed buyers, brand rejecters, Wal-Mart shoppers, to name a few. Consumers fitting this profile were then invited to focus groups with the intention of the cross-functional team of taking a deep dive into consumers habits and practices in order to determine such useful information as how they use the brand and what are their perceptions what are their unmet needs are the category. This foundational understanding of the core consumers' would fuel the innovation pipeline. In this case, the outcome can be classified in two categories. The first being product characteristics that the team already knew but were able to substantiate; namely the consumers express a need simple meal solutions, with simple being defined as items on hand, fast prep time and having broad family appeal; the brand enjoys a tremendous equity but its usage is limited to an ingredient as its texture is too thin to be used as a topping. The second category was the compelling insight; L&P consumers typically love the taste of L&P and would be interested in using it like a steak sauce if it had a thicker consistency.

Armed with this qualitative information, the team set out on parallel paths. R&D began working on a formulation for a thicker version of the L&P Worcestershire sauce. Marketing and Marketing Research began putting concepts together, which were to be evaluated by an outside vendor relative to the competition. These concepts typically consist of three core elements:

- (1) insight, which was derived from the focus groups (in this case something to the effect of “I love L&P, but sometimes I wish L&P came in a thicker format”);
- (2) a relevant benefit (“thicker L&P for use as a topping”); and
- (3) a reason to believe (“from the trusted L&P brand”).

Variations on the above were tested with consumers in a concept screen (typically online, in the not so distant past in central location intercept, such as shopping malls) from which the most promising were further pursued. Typically, the concepts are evaluated against themselves initially on claimed arguments, which almost always overstated measures such as purchase intent, frequency, uniqueness, price/value, likeability, and the more refined concept, which is then compared to competitive set of competitive offerings. This proprietary database is supplied by a vendor, like BASES (www.bases.com), which benchmarks these key metrics against similar proposed launches by the competition. This comparison helps build the initial business case to senior management who determine how viable the business initiative is in terms of consumer acceptance and potential profitability. Although this analysis adds very little to gauging the new product’s sales potential, it does give a cursory read as to how well the NPD concept may perform in the marketplace.

Once the NPD concept scores well enough to proceed, the next step is getting graphics involved with the proposed design. Careful decisions are made here regarding the parent brand equity, how to leverage it without diluting it, how to blend in but be noticed. A number of variations are evaluated with consumers, making sure the most viable opportunity is followed. Simultaneously, marketing team members begin working on a marketing plan to help determine the potential support for this initiative. Questions that are typically asked and answered include: Will the product detract spending from the parent brand? How much distribution does the company want to achieve? In general, the more product distribution results in more the slotting fees paid to retailers. Still, the initiative needs to be sized in terms of the business opportunity. How much product can be sold? How much will be sourced from the base brand?

These questions can be answered a variety of ways. The risk associated with such a launch eliminates the simple linear forecasting methods, such as the naïve method. Since a large number of forecasting vendors specialize in this stage of the NPD process, some are contacted for their services. Some vendors suggest a regional launch; this can be cost and time prohibitive not to mention the competition learning about the new product and can, thus, react much quicker than versus a national roll-out. In the case of a national roll-out, a simulated test market (STM) is created based on the performance of similar brands or products and answers to questions of what consumers are likely to do, adjusted for overstatement to get at the “interested universe”, assuming everyone knows of the product (awareness) and can find it (distribution). This 100 percent awareness and distribution scenario is of course unrealistic. Hence, the vendor will request a marketing plan from their client and marry this information with their model and consumers’ responses into the forecast. Getting the inputs right is critical, as is alignment on survey data and its interpretation and benchmarking versus similar historical launches. The output of this process is a forecast, both for the sales of the new product and incrementally to the portfolio, which will be used by the finance departments to make feasibility, payback, capital expenditure calculations and, ultimately, a decision on whether to implement the new product.

If all is a go at this point, the various flavors/consistencies from R&D are evaluated with consumers, the packaging is finalized with further consumer feedback, the factory begins limited production runs and the product itself is evaluated with consumers, usually in an in-home usage setting. Importantly, any complications along this process can stall or kill the project. Once consumers accept the sensory profile of the product, the forecast is revisited to reflect the in-home usage results, the communication strategy is developed, creating projected advertising levels, alighting of advertising, to name a few, and finally executed.

In summation, the NPD processes at Heinz are one of attention to detail and highly structured, as the market penetration and maintenance stakes are immense. The feeling of collaboration on a project well done and seeing it come to life are quite rewarding, hence the strong level of collaboration across the functions. It still remains to be seen if the new product will be a success, as this fact is reflected in the summary table of all four companies' product development in Table I.

4. Comparison and discussion

As is evident from the companies studied, the leveraging of strategic product development systems require that there is proper management of the manufacturing/packaging processes in a collaborative environment to insure product quality control, maximize inventory usage, and ultimately reducing manufacturing and operating expenses to increase the projects' revenue streams. A collaborative solution to successful NPD processes insures that the infrastructure allows for coordinated communication among plant floor and business systems in order to enable people to make informed, real-time decisions when faced with production design and manufacturing challenges. Through a collaborative environment that is inductive to sharing live production events with the planning and scheduling processes allows continuous improvements to operating performance metrics and team integration issues.

More intensive upper management support in NPD processes should enable increased agility in making responsive decisions within a collaborative manufacturing environment. This should be especially true in an IT-intensive environment associated with manufacturers and service providers. Upper management support should be instrumental in allowing for increased confidence in making difficult decisions by technical team members in re-engineering its manufacturing and/or supply chain practices to meet specific challenges in an accelerated environment. Without strategic management's support, it would be next to impossible for team members involved in the design phase to overcome the numerous barriers placed before them via corporate inertia and culture. Upper management support is essential for successful implementation of technical team integration issues that vary from fluctuations in manufacturing yields such as problems or delays in the fabrication, assembly, testing or delivery of our products and dealing with problems or delays in shifting products to smaller process technologies. In addition, upper management's support is required in achieving higher levels of design integration in order to retain and hire key technical personnel.

In essence, there is sufficient research that development team integration activities, along with product characteristics that promote collaboration and information sharing, significantly impacts the threats to successful launches associated with product complexities (namely, the constructs of product newness, technological uncertainty, design outsourcing, and project acceleration as defined in Table I).

Company	Type of industry	New product introduced	Type of product (good or service)	Customer requirement?	R&D/research techniques	Successful?	How did the product give the company a competitive advantage?
PNC Financial Services	Bank	Virtual Wallet	Service	Faster banking available 24/7	Hired a consulting firm to study and survey Generation Y to see what they want from their bank	Yes	Virtual Wallet allows customers to complete all banking transactions online, alerts them when bills are due, warns them when they are low on funds, and teaches them how to save for future purchases
Imperial Land Corporation	Real estate development	Developable, saleable land	Good	Purchasable land with accessibility and existing infrastructure	Hired consultants to correctly lay out the region reducing costs and increasing inventory	Yes	Imperial Land can offer pad ready sites to potential purchasers, a product that is not readily available in the region at this time
SuperValu	Grocery distribution	Vocollect System	Good	Ability to electronically track items in the warehouse, allowing for faster packaging and delivery times	R&D was used to determine a way in which to "streamline" their packaging and distribution process	Yes	SuperValu can now distribute their item to their customers in less time with fewer people, therefore cutting down on lead time and costs of labor
Heinz North America	CPG (food)	L&P Thick Classic	Good	L&P flavor, thicker texture	Qual/Quant, forecasting	TBD	TBD

Competitive approaches to NPD

Table I.
Product characteristics, that promote collaboration and information sharing, significantly impact the threats to NPD and manufacturability

5. General conclusions and implications

5.1 Comparative analysis

The case studies discussed in the present research focus on NPD experiences from four different companies:

- (1) Heinz;
- (2) SuperValu;
- (3) Imperial Land Corporation; and
- (4) PNC Financial Services.

All of these companies have very different marketing strategies and very different ways in which they design and development their products. However, as different as these companies do business and develop products, they are all highly successful at what they do and the products/services they produce, so lessons may be derived from following incremental and more radical approaches that require different levels of risk.

In 2008, PNC Financial services launched their newest product aimed at the younger, professional generation that have little or no experience of balancing checks books by hand. Since this group is very comfortable with 3G wireless cell phones, computers, radios, MP3, to name a few, they wanted to be able to not only check their account balance online, but they also to be able to pay bills, transfer money from one account to the next, and balance their check book, all from the comfort of their computer desk. The company successfully launched a new financial product, Virtual Wallet™, which allows clients to save for future purchases, and notifies them when bills are due, and when funds are getting low. Since the original release of the Virtual Wallet™ in 2008, it has proven to be highly successful with great potential for growth.

The management at Imperial Land Corporation (ILC) buys and sells large plots of land for commercial use and construction. Their clients are always in the market for land that has easy accessibility and a pre-existing infrastructure. For ILC to be able to provide this type of product they had to do the proper research to be able to develop areas, and to unsure those certain areas could be developed. By hiring consultants to perform this research and properly dividing the land tracts, reductions in the cost for ILC and increased satisfaction of the needs of their consumers resulted. By continually following these practices, ILC has satisfied its consumers and showed that following the guidance of their consultants they can continue to have success in the property sales field, even in an economic recession where land values and new construction starts have dropped off considerably in the nation.

In the market of grocery distribution, management at Supervalu uses technology to keep their distribution process running smooth and efficient. Initially, Supervalu started using Vocollect Systems in the early 1980s to advance the way in which they tracked and shipped their grocery items. By incorporating the Vocollect system into their everyday operation via an incremental approach to NPD, the company was able to reduce their labor cost, increased labor productivity, reduce throughput times in the distribution system, and increase their production and lower their lead time in harsh economic times in a very competitive environment. This technology proved to be successful for Supervalu and for Vocollect. The new inventory tracking system allowed Supervalu to stream line their package and distribution process, giving them a competitive advantage; while management at Heinz North America utilized various

internal and external tools in conjunction with the NPD process to launch new products. Whether using qualitative focus groups, concept screening, product testing, benchmarking, or volume projections in order to create a compelling the business case for its latest product launch, Lea and Perrins Thick Classic™, the company uses a very detailed and highly structured approach to NPD.

However, as demonstrated by the case studies, there are still many concepts to be mastered in understanding the development of the new economy concept of barriers to exist as a replacement for the barriers to entry strategy of the old economy. Global corporations achieve this mix through the combined use of high technology and personal interaction, techniques that should be transferable to manufacturing/service concerns as well. High technology can be used to gather information about customers so that a positive environment can be created for the customer's experience. This environment is tailored to the customer's specific needs and wants. It also provides an instantaneous solution to the customer's needs. Thus, technology allows manufacturers and service providers to service the customer practically everywhere, all the time. Manufacturers and service providers can respond immediately to customer queries either via online search and retrieve functions or via fax-back services. Manufacturers and service providers also can provide price quotes, comparisons, detailed product and service information, shipping and handling charges, and related information. It is through the application of value-added activities that prompts customers for return service to manufacturers and service providers. The overarching theme that is apparent in the case studies is that whether out of desire or necessity, these organizations realized that incremental innovation begat radical innovation, in the sense that standing still is really taking a step back. By utilizing various vendors who are experts in various stages of the new product development process these organizations were able to improve their offerings to consumers and thus made themselves a more competitive organization within their sector.

5.2 Strategic implications associated with new product designs and project teams

As noted by Al-Karaghoul and Fadare (2010), Koufaris (2002), Memon *et al.* (2010), and Smith (2003), much of the manufacturing strategy literature is concerned with technical aspects of environmental mapping and with locating, classifying, and auditing particular products, processes, businesses and companies against generic externally given criteria. However, by adjusting manufacturing methods, product designs, and team integration processes, manufacturing performance can be improved and competitive advantage regained. Upper management should support a collaborative environment. Earlier and more intense involvement from manufacturing personnel associated with design and production should allow management to better deal with the ever-changing customer requirements in a more efficient manner. Therefore, as noted by Tranfield and Smith (1998, p. 115):

It is usually implied that this strategy-making process needs to be revisited regularly, although usually there is little guidance available as to how often this should.

The typical types of routines in manufacturing that directly impact on coordination problems are frequently found in manufacturing environments and include gathering and processing information, linking customer experiences with product and

organizational design choices, coordinating factories and component suppliers, and bringing new products to market.

As found in the present study, the traditional threats of technological and product complexity, product newness, technological uncertainty, design outsourcing, and intentional project acceleration are not the major forces of concern in implementation of successful strategic manufacturing management. These forces may not be generally cost effective to become more manageable in the foreseeable future. However, product team and technical team integration issues are certainly under some degree of control by management and deserve to be treated with proper respect in formulation of manufacturing strategy. As evident in the current case study and research by Althonayan and Sharif (2010), Swink (1999, 2000), and Maad and Coghlan (2010), team integration and technical PM play critical roles that should be leveraged for sustainable competitive advantage. These concepts are in general agreement with the basic tenets of the RBV-based philosophy (Michalisin *et al.*, 1997, 2000). Unfortunately, creating a viable list of proven and exploitable manufacturing and service competencies and/or capabilities in a single model is not yet well articulated and accepted by academics and practitioners alike. The comparative analysis presented in Table I is just a precursor for such a comprehensive undertaking.

5.3 Future research and limitations

Sound leadership grounded in appropriately applied strategic management support systems facilitates collaborative manufacturing team integration and enhances NPD/NPM processes. As evident from the results of the various elements discussed in the present companies' case studies, earlier and more intense managerial involvement enhances overall manufacturability and serviceability of products. Organizational group characteristics of technical team integration processes act as moderating influences on manufacturability concerns that are essential to promoting sustainable competitive advantage in the domestic manufacturing and service industries. Future research on team integration/PM characteristics associated with product development and manufacturability-related processes are needed to better prevent major strategic mistakes that result in loss of market share and profitability.

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