

## **Background:**

Crystal Fountains Inc (CFI) retained Team 2 from UofT to review and develop strategies to alleviate current lags in its new product development process. Team 2's investigation included a total of three meetings with members from various departments at CFI, a review of previous reports, and an in-depth literature review.

The investigation and discussions with leaders from the R&D, Procurement, Product Engineering, and Manufacturing team resulted in the confirmation of two key issues. These issues were the Lack of Information Transfer across department streams and Management Processes in place. Although the R&D Labs Team has adapted a new Agile Approach, this culture has not yet permeated the remainder of the organization, leading to bottlenecks and delays in new product launches. This is impacting the company's goal, which is to have 65% of sales resulting from new products developed within the previous three years. CFI aims to spend 15% of its yearly revenue on R&D, approximately \$2.3M and \$2.8M in 2020 and 2021, respectively. Given this high level of investment, it is crucial to understand what the current level of operations costs the firm. Discussions with CFI indicated that the current new product development process leads to delays between nine and twelve months. To alleviate the two key issues noted requires a multi-dimensional approach to address new product development processes, organizational structure and operations, business strategy, company culture, and commitment to the business strategy and culture.

## **Analysis:**

Crystal operates under two major business strategies, focused-differentiation strategy (customized products), and differentiation strategy (new products). In reviewing the new products produced by Crystal, it was found that these products fall into the Disruptive Innovation space of product innovation, whereby new technology is introduced into an existing market. Understanding the strategies of both the business and new products allowed for the development of a frame of reference based on processes and strategies of firms that fall under similar categories.

CFI has attempted to reduce this lag before by introducing variations of the Stage-Gate process; however, the Company cited a lack of innovation culture, which resulted in the failure of both the traditional Stage-Gate approach and the Stage-Gate Xpress, a shortened version of the conventional Stage-Gate model. Barriers to the success of this process included lack of buy-in from management, high overhead costs due to constant approvals required from management across department streams, and a rigid process not suited for iterative design.

Prior to developing solutions, it was important to understand the costs incurred due to product launch delays. A calculator was developed to analyze the impact of a one to twelve-month product launch delay. A case study was conducted for three products, the LED165, LED040, and TNN080, with data used from a previous report completed for CFI. The calculator showed approximate profit losses of \$114k, \$95k, and \$696k for each product, respectively, if they were delayed by nine months. These values were found to be significant and were used to evaluate the cost of solutions.

A review of three processes that are typically implemented for products in the Disruptive Innovation space was conducted. The processes included Bounding Box, Spiral Model, and Concurrent Engineering, a sub-application of Integrated Product Development. The Bounding Box approach was found unsuitable for CFI as the measurable objectives for this process would vary substantially, and the solution requires a high level of communication between departments. The Spiral Model was found unsuitable as it requires a high level of risk analysis expertise and it is not suitable for more low risk, smaller projects.

## **Solution & Implementation:**

It is recommended that Crystal introduce Integrated Product Development; however, in a two-tiered approach. The first tier would be the introduction of a process/innovation manager to bridge many of the gaps caused by a functional organizational structure. Companies with a Differentiation Strategy that constantly develop new products tend to have a Matrix organizational structure as it allows for better levels of communication across departments. Crystal is aiming to produce two products per year, so a complete reorganization from functional to a matrix is not recommended. Instead, a process manager is recommended to link teams in the Procurement, Production, R&D, Product Engineering, and Marketing & Sales departments. The process/innovation manager's key roles would be to bridge the gaps and identified shortfalls with current organizational structure, address current process drawbacks, enforce the Integrated Product Development processes outlined within this report, and continuously assess and improve changes in order to maximize the company's efficiency.

The Process Manager is recommended in order to enforce principles of Concurrent Engineering (CE), a strategy whereby tasks involved in the new product development process are done in parallel. CE consists of seven major activity groups done throughout a project; these include Definition of Goals, Product Planning, Design, Production Planning, Production, Manufacturing and Assembly, and Delivery. Timelines of these tasks are staggered, such that three tasks are always being done in parallel. There are five "loops" along this process with critical outputs. These loops include the Feasibility, Design, Production Planning, Production, and Manufacturing loop. CE principles are tuned for an increased market pace and typically result in companies delivering products quicker to the market.

The Process Manager's role would be to first review the principles of Integrated Product Development and Concurrent Engineering and develop a workbench to test the proposed process and evaluate performance for a new product. This manager's role would be to schedule and plan the seven new product development stages using CE principles, establish the transition of responsibilities from R&D to Production, improve communications with the Procurement team, ensure adequate product information is provided for manufacturers, and bridge the production involvement gaps.

#### **Additional Concerns:**

In addition to these recommendations, it is also recommended that CFI review other key issues flagged during this investigation. Information Duplication should also be a priority. During the investigation, members of CFI noted the trend of "tribal knowledge" within its production teams. Staff are typically designated to one station and have therefore gained a depth of knowledge regarding the assembly of their parts. This knowledge isn't adequately captured in the standard operating procedure (SOP) documents, leaving the company at risk. It is recommended that one to two employees complete shadow sessions so that one individual does not retain all the critical knowledge. SOP documentation must also be improved by interviewing the key staff to capture all essential details for product assembly.

Additionally, it is recommended that product data sheets be reviewed thoroughly prior to submission to the manufacturer to avoid the potential for delays. Finally, CFI must establish a technological identity to align itself with the products it produces; this is essential to developing a culture of innovation across all departments. New product development is critical to increasing market shares over time, and culture and buy-in are required in order to execute the changes and recommendations highlighted in this report

