Review

I conducted this review with the mindset of a person who was reading the paper to learn about product families and how a company can use product families to its advantage. If I were to give this paper a rating based on that mindset, I would say that it was merely acceptable based on its originality. The paper took facts from other references and compiled information from a large number of sources, including employees actually involved in the processes; however, much of the information they presented did not seem to be very intellectual. For example, if I were to look at Sony’s product variety, I would assume that this gave them an edge over their competitors because there would be a greater chance that a customer could find a product that satisfied him or her when looking at a larger selection. A more novel idea may have been that Sony’s product variety possibly hurt them because it confused consumers about which product to buy or that their variety helped them by implying that they had found a base product that worked, and they were in the process of expanding upon it while other companies were still looking for that base.

The paper was not very relevant in terms of science or engineering since it focused on product design rather than the changes that would need to be implemented to take on the manufacturing of a product family. A relevant engineering article would have discussed the costs, time requirements, and limitations of making a product changeover in a manufacturing facility. A key point the article does make is that engineering should be included in the design process in order to get the perspective of a larger group of people.

The reviewed paper was very complete in that it described how Sony both achieved and maintained its success. It gave a good background on the development of the initial Walkman and how the idea for the product came up. The authors compiled lots of information into one source, including data from 260 personal stereos, interviews, and other published articles.
the conclusions being made. I also learned to focus on the main message of the paper and determine what more could be added. In this manner, I give myself a good starting ground for looking up additional information and sources, if necessary.

The reflection of the paper taught me to look back on a paper after reading it in order to fully understand the big picture. Sometimes I tend to focus too much on key points and this causes me to miss the overall message. I also learned the importance of applying my reading to topics I am currently studying in order to determine if the reading reiterates what I have learned. This enables me to get a broader understanding of the topics being discussed in my classes than I would get if I were to simply review the course notes and/or textbook.

The review taught me the importance of evaluating a paper so that I do not make the same mistakes. As a graduate student I will obviously be required to write a lot of papers, and by reviewing the papers I read, I can stay away from mistakes I have previously seen. Additionally, if I find a certain writing style or use of visuals to be effective, then I can take advantage of that whenever I write.

As a whole, this assignment taught me the difference between reading and learning. When you read something, you take in the facts so that you can use them at a later date. Though, when you learn about something, you get a better feel for the data that exists and the numerous ways it could possibly be interpreted. By realizing that no one view on a topic is necessarily correct, it enables you to be more open when looking for solutions to problems related to the topic.

For the remainder of this course, as well as the remainder of my graduate studies, I plan to take more of a learning perspective while reading than I have in the past. It takes a little bit more time to learn from a document than it does to simply read it, but it also makes you more of
Organization of manuscript

The paper is fairly well organized, but content seems to be somewhat arbitrarily divided into sections with section titles specific to this product. A more useful format would be to create sections based around each step in the development process in general (e.g., "Developing the Fundamental Platform Element"), instead of specific aspects of the case study under consideration (i.e., "Focus on the Blade Design").

Clarity of expression, tables, graphs

The author relies on figures to explain many of his main points. This is often an effective approach, but it requires clear, easy-to-understand figures. However, the author provides fuzzy figures with unreadably small text in many figures (e.g., Figure 19-8, 19-12, 19-13). In other figures, complicated schematics obfuscate the author's message, and leave the reader confused by a spaghetti of bold lines. The author inappropriately uses tables in some cases (e.g., Figure 19-4 and 19-13) where a simple flow chart or timeline would be easier to understand.

What you learned

This was a fascinating paper to me, since it introduced me to techniques for product family design. I have not read much on the subject before, and this paper made it clear how these concepts could be applied to many common products, even something as simple as an ice scraper.

What is your overall impression of this work? Justify

I am impressed by the ease with which this paper may be understood. The simple product example helps the reader understand and apply the concepts. However, I also feel that the paper is oversimplified in some areas and lacks the depth that a proper scientific article should possess. A lack of references and fuzzy figures, for example, imply an aura of amateurishness.

Learning

What did you learn from each part of this exercise? What did you learn from the three parts taken together? How are you going to use this learning in the course

As a graduate student, I often review and write scientific articles, but it is helpful to break down the components of a critical evaluation and review and examine each part in detail. Effectively communicating information is the mark of an effective engineer, and the ability to seamlessly weave together technical details, anecdotal evidence, and clear figures and tables into an informative narrative is essential for any technical writer. As I write papers for this course, I will try to remember each of the components under consideration for this assignment. I will also try to consider all the parts in sum to evaluate whether the parts of my papers have joined to form either an effective narrative or a jumble of facts. This exercise has reminded me that it is not entirely what you say, but also how you say it, that determines the extent to which you will inform and educate your audience.
Queries

1. Mass customization has been adopted, to great success, as firms' sole manufacturing paradigm.
   Companies such as Dell are proof of the power of mass customization as a business model. The author's conclusion that mass customization alone can lead to mediocrity seems unjustified.

2. Has the NBIC model really been a financial success?
   The NBIC model has undoubtedly benefited the company in a particular niche market segment. It is not shown to have helped the company fight off competition in the mass market.

3. NBIC's model can be applied only to market segments where consumers are willing to pay the additional costs of customization.
   In my opinion, the author fails to pay due heed to the fact that NBIC has applied its model only in the manufacture of its high-end brand (Panasonic) and not the other brands (National and Hikari).
   The co-existence of mass production and mass customization is made possible by the relatively low cost difference between the mass produced and customized Panasonic bicycles—the latter types are 20-30% more expensive than the former. The cost difference will be much higher for the other two bicycle brands. NBIC's model has been proven to work only in the case of products aimed at affluent consumers.

4. Not all firms can emulate NBIC's practice of using only proprietary or in-house technology and processes.
   The author cites NBIC's ability to use proprietary and in-house technology as one of the factors behind the company's success. The author also talks about the owners and employees of the company having been in the bicycle industry for a long time and the unique knowledge they have thus built up about their product. This knowledge is perhaps one of the reasons for the employees' ability to develop their own technology and processes. Very few companies' employees can claim to possess such knowledge. They are, therefore, forced to rely on outsourced technology and on management consultants to improve their manufacturing processes.

References that support the principal theses of this work

   Based on the results of a quick google search, this seems to have been a well-received paper in the research community. One of the topics addressed in this paper is the widespread use by strategy researchers of standard statistical descriptors to evaluate strategic options and make recommendations to managers. Bettis (1991) specifically suggests using more situation-specific techniques to prescribe strategies to be adopted by various firms. In using this reference, the author profits on two counts: a) he justifies the motivation to study the factors behind NBIC's success and b) he includes an important reference in his bibliography. The reference has, therefore, been well utilized.

   Factory focus is an important part of the NBIC model. Skinner (1974) appears to have been the first to research the benefits of this concept. The author is able to apply this reference effectively in the present context.

• Action items: Identify references that support the principal theses of this work. How has the author used the references - marginally, well, etc.? Why?
I was unsure what to do for this part of the assignment since the author did not cite any references. I searched and found multiple research papers on mass customization and the principles the authors used in their work. I was unsure if I should just list all of the references or what I should do. I picked out three of the references and talked a bit about two of the resources (one published before the 1997 work and one published after). Since this article outlined the basics of how to effectively mass customize, I felt as though the following list of references were helpful and pertained to the work done in this article:

(1) “The what, why and how of mass customization”
(2) “Future Perfect”

It seems that at times McCarthy in (1) used some of the same sources as the authors here McCarthy’s work provided more of a literature review on how to design and operate a manufacturing system capable of mass customizing. Both McCarthy (2004) and Feitzinger and Lee (1997) discussed “postponement” as a key element to mass customization. McCarthy actually cited this Harvard Business Review article by Feitzinger and Lee 1997 From the McCarthy article, it seems as though Feitzinger and Lee (1997) are known in academia for their discussion of the difficulties a company can face when trying to mass customize. The McCarthy (2004) resource also led me to resource (2). The book is by Davis, who is said to have coined the term “mass customization.” In this book, Davis outlined the new trend of segmenting markets and offering customized products to customers. He described mass customization as a strategy that involved producing goods and services for a relatively large market, while aiming to take care of the needs of individual customers using an array of product and cost options. Looking through the literature, it seems as though his work or other work around the mid 1980’s snowballed a TON of work on mass customization. Feitzinger and Lee (1997) had to use the Davis work and the papers following his book publishing “well” to be able to explain mass customization and use their own HP examples to reinforce the potential for increased profits that is in mass customization. If you need any more references, I would be happy to provide you with a more detailed list of papers I found on compendex. I just did not see the need to go on and on and on linking the Feitzinger and Lee (1997) work to paper after paper.

2. Reflect:
How does the work presented in this paper apply to this course? How do you think you are going to use this information?
We must remember that everything we do in this course should apply to our course question regarding how product realization teams can provide increased product variety at less cost for a highly competitive, global marketplace. The work in this paper shows how HP has effectively used mass customization to dramatically increase their product variety, slash lead time to meet customers’ orders, and reduce costs in the U.S. and across the globe. First of all, I used the information in this paper to learn what it takes for a company to effectively mass-customize. After learning the basic concepts, I feel as though I have now built a foundation to learn more about product families, commonality, and more complex concepts in the future. After all concepts are introduced in the course, I can take the information learned in this exercise along with information learned throughout the rest of the semester and apply it to a semester project.
infrastructure needed by companies to achieve success. PDM, ERP, commonality, standardization, and other issues mentioned in this paper directly relate to the implementation of the concepts presented.

Until reading this paper, it had never really occurred to me to consider product design and engineering services as linked. I assumed the material in this class would be more driven to the development of platforms, and the lectures so far linked with this paper has forced me to realize there is so much more to it. I realize I can’t just open up SolidWorks or CATIA, create a part that is common and can be used for several different configurations, make it, and sell it. There is so much more that goes on behind the scenes, as I will discuss in the review section. The information in this paper shows a system-level mindset that will be highly useful to refer to if/when I end up in industry, and in considering successful development of products.

As I said previously, a lot of what was in the paper seemed to be common sense. Possibly this is because of my past experience. I worked at a place called Blackwater for about 8 months designing military vehicles. The main vehicle I worked on was called the Grizzly, a 50-ton Armored Personnel Carrier that could take a shot from a roadside bomb and keep rolling. In doing this, as they often do, the military wanted different variants. Our goal was to produce three different trucks, a single axle truck, a dual-axle truck, and a tandem-axle truck. The result: epic failure. Shortly after I left, the manufacturing division of the company went under. I tell myself all the time that it was because I was no longer there, but truthfully it was because the concepts in this paper were lost on the management and design team. The main example of this: I helped implement PDMWorks, SolidWorks’s PDM client simultaneously as the Controller implemented MASS00, the ERP/MRP software. They were not linked. The disconnect between the two was so bad that my co-intern had to develop a part number generation database with access, and then each part number had to be dealt with individually with each system. However, the concepts in this paper were not completely lost on them, as they did strive for commonality in parts and design. The cabs for all three variants were the same, as well as most of the chassis and engine components. However, too little too late, and failure ensued. Perhaps if the concepts in this paper had been the focus and mindset of the manufacturing division at Blackwater, it would still be operational today.

Review

The paper as a whole was well put together; it did not jam mathematical formulas together or spam visual data. It took a practiced, sequential approach to sharing the information and concepts it presented. However, it was sparsely referenced, and there were a couple of graphs that made no intuitive sense, and took too much thought to understand, which took away from their effectiveness in the end. Specifically under 5.2.1, “Figure 20-8 Variety dependent volume of information”. The graph shows three different curves and the amount of information they produce, along with three parts on the x axis, but I didn’t feel the x-axis was explained very well. In contrast, Figure 20-7- Product information flow was very helpful in understanding the current system at ABB.

If industry is my target audience, the costing models and the mathematics are pointless, and should be left for a different paper. Most of this paper talks about conceptual ideas, or even implemented ideas at
Attachment 2:

Notes from the Paper:

Lessons Learned:

1. Lutron stopped looking at dimmer switches as a commodity and started viewing it as an environmental enhancement. This focuses on the needs of individuals who use the products and creates a need for products within certain markets and it creates variety to meet different application. Clear message: “Enhance your visual environment through dimming.”

2. Success depends on expanding the market. Lutron doesn’t grow its business by taking market share, but rather by expanding and developing new markets.

3. Innovation and superior quality are important to customers for product differentiation. Innovation is a hallmark at Lutron. Lutron has a number of firsts over the years, and as of the writing of this paper Lutron estimated it held 80 percent of all U.S. dinner patents. Often creates products so original that the market hasn’t yet realized a need exists. Dedicated to quality, Lutron was one of the first 20 companies in the US to be registered ISO 9001.

4. Willing to fight against Goliath. The company’s commitment to succeed is reflected in an annual investment of at least 10 percent of sales revenue into the research and development of new dimming technologies.

Victims of our own success

The proliferation of SKU’s caused many headaches and cost the company money, but it taught the importance of continually rationalizing a product line, in other words, existing products need to be obsoleted when new and improved products are developed. By using appropriate technology and integrating it with simple user interfaces, Lutron has been able to develop “smart” products that can be quickly modified by software and programming changes. It is this easy field configurability that allows Lutron to provide precisely the right product for the individual needs of each customer. Semiconductor intelligence has shifted product differentiation from slow, expensive hardware changes to rapid, less expensive software changes throughout Lutron product lines.

How to Mass Customize:

Common design elements permit last-second changes. to determine their final identity. In the production cycle, a dimmer that comes off the production line may easily be modified. The simple assembly of a few different components at the end of the production cycle determines the “flavor” of product. By delaying the decision about what product a dimmer will become until the last possible moment, Lutron can keep inventories appropriately low and respond quickly to rapidly changing market demands. Assignment of one of eight colors to occur at the end of the production cycle. Color components literally snap on in seconds.

Mass Customization Reaches Every Department at Lutron:

At Lutron the ultimate goal of this process is to offer customers good value and wide variety and to deliver products very fast in small, medium or large volumes but to do that with lesser quantity of variety internally. Simply it’s providing value with variety.

The following elements drive mass customization as a total company process within Lutron:
construct of this paper like below.

<table>
<thead>
<tr>
<th>1</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Walkman product family</td>
</tr>
<tr>
<td></td>
<td>1) Genesis</td>
</tr>
<tr>
<td></td>
<td>2) Factors for success</td>
</tr>
<tr>
<td></td>
<td>a. Patterns of product competition</td>
</tr>
<tr>
<td></td>
<td>b. Sony’s technological evolution</td>
</tr>
<tr>
<td></td>
<td>c. Sony’s management of technology</td>
</tr>
<tr>
<td></td>
<td>d. Sony’s approach to understanding customer lifestyle</td>
</tr>
<tr>
<td>3</td>
<td>Discussion: including alternative explanations</td>
</tr>
<tr>
<td>4</td>
<td>Conclusion</td>
</tr>
</tbody>
</table>

- Clarity of expression, tables, graphs
  - I think the expression of this paper is overall clear. The sentence and grammar showed easy expression to read and understand this paper without difficulty. The tables and graphs were also used properly.

- What you learned
  - I can learn the technical writing method and how to write the paper. Also, I can grasp the overall paper construct and the contents in each part. In addition, I can get the correct method to use table, graph, and examples. Next time, by using this information acquired from here I would like to try to write the full paper.

- What is your overall impression of this work? Justify
  - In my opinion, this paper’s grade is excellent, because there are two reasons. Above all this paper has good structure. This paper declares the distinct objectives and supports these by using proper evidences such as four main success factors. Also, each evidences are explain with clear and easy expression by using proper tables and graphs. Next, this paper shows the new point of view for the success condition of Sony which differs from previous studies’ point of view.

Step 4: Learning:

What did you learn from each part of this exercise? What did you learn from the three parts taken together? How are you going to use this learning in the course?

- Learn from each part
  ① First part: First of all I can get the objective data which is not involving my own opinion, and arrange the data according to the original content of this paper. Next, I can evaluate