Leveraging Information Technology to Gain Competitive Advantage: A Case Study on General Electric Consumer Products

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ABSTRACT

*The purpose of this study is to analyze the impact of merging **General Electric Lighting** (GEL) and **General Electric Appliance** (GEA) into **General Electric Consumer Products** (GECP) and how IT strategies are used to gain competitive advantages in its industry. This study will analyze major IT projects being developed and implemented in relation to their impact on major information flows, organizational structure, IT architecture, control systems, and the labor characteristics of the IT function. Alternatives to achieve integration will then be discussed and recommendations will be proposed.*

INTRODUCTION

General Electric (GE) is a diversified service, technology, and manufacturing company with a commitment to achieve customer success and worldwide leadership in each of its businesses. GE's mission, as explained in its annual reports (2001), follows its traditions and values. GE's three traditions are unyielding integrity, commitment to performance, and thirst for change. GE's values include passion for customers, meritocracy (providing opportunities for employees based on individual success), global focus, respect for its employees (and their ideas), playing offense, embracing speed and excellence, and living the hallmarks of GE leadership. Jeff Immelt, CEO of GE, recognizes that in today's dynamic business environment, standing still is not an option and that the current business environment is forcing companies to differentiate themselves from their competitors to win sales and retain customer loyalty. By streamlining communications between customers, suppliers, internal customers, and business locations, GE is embracing speed and excellence. GE recognized four key areas to drive their future growth that include globalization, services, digitization, and six-sigma.

To create a competitive advantage and to allow a more cost-effective approach for new technology investment, *General Electric Lighting* (GEL) and *General Electric Appliance* (GEA) recently merged to make *General Electric Consumer Products* (GECP) (Murray, 2002; Anonymous, 2002a). GECP will be headquartered in Louisville, Kentucky with other operations located in Cleveland, OH and throughout the world (Murray, 2002). The home products originally made by each company target a 60% similar customer base. Because of the commonality of these two divisions, GE expects to integrate several customer service IT projects in order to increase customer satisfaction and to streamline the purchasing process. GEL will still maintain its industrial and automotive groups, which are not in the same original customer base of GEA, but will be a part of the composite GECP. With GE's strengths in technology and innovation (Edelheit, 1998; Morone, 1993; Robb, 1991), employee training, learning, and development (Lynn, et. al., 1998; Stockman, 1999), strong upper management leadership (Fulmer, et. al., 2000; Morone, 1993;), and well-established goals and strategies (Collins and Porras, 1991; Edelheit, 2002; Miles, et. al., 1995), the emergence of GECP provides opportunities for growth due to innovation and brand recognition, for deepen and broaden of product lines, and for customer retention due to the pooling of similar customer base and technology innovation.

One of the major tasks facing GECP is to integrate the ERP system that is currently used at GEL with the custom applications used at GEA. GEL is using SAP, a purchased commercial ERP system, while GEA is using a mainframe with customized applications built in Visual Basic, Java, and other development languages. Along with integration of these two divisions, GECP also wants to maintain and improve its customer centric focus with several applications that are part of the GE infrastructure and core components, such as CustomerNet and SalesNet, to support its e-business strategy (Murray, 2000). Major IT projects being developed and implemented include (1) VoiceXML technology that will be used to improve CustomerNet and (2) wireless technology and Digital Prospecting that will be used to improve SalesNet.

The purpose of this study is to analyze the impact of merging *General Electric Lighting* (GEL) and *General Electric Appliance* (GEA) into *General Electric Consumer Products* (GECP) and how IT strategies are used to enhance GECP's goals and strategies to gain a competitive advantage in its industry. This study will begin with reviews on several major IT projects, such as VoiceXML, wireless technology, and digital prospecting, being developed and implemented and then analyze those projects in relation to their impact on major information flows, organizational structure, IT architecture, control systems, and the labor characteristics of the IT function. Then, different integration alternatives will be proposed and recommendations will be provided.

RESEARCH METHODOLOGY

The study was conducted through the use of interviews, surveys, site visits, literature reviews, and data analysis between August 2002 and February 2003. A co-op student also played an important role during the data collection stage. Due to the complexity of organizational structure, information gathering often involved many levels of communications. Although there were difficulties in getting cultural perspectives on sensitive information, all personnel who were interviewed have been more than willing to offer information for the study. Analyses were conducted using and recommendations were drawn from concepts, tools, and techniques from strategic management literature.

IMAJOR IT PROJECTS BEING DEVELOPED AND IMPLEMENTED

IT projects examined in this study are VoiceXML, a wireless project, and digital prospecting. A brief description of each project is provided below to facilitate later discussions.

CustomerNet and VoiceXML

CustomerNet is an ongoing IT project that connects customers with GE via the web. It is an electronic one-stop shopping channel that enables customers to perform all functions, as summarized in Table 1, necessary to order GE products. CustomerNet is a no-cost, marketing and ordering system that allows customers to spend less time on the phone or using FAX machines, to provide customer assistance 24/7, and to make doing business simple, easy, and profitable.

VoiceXML is an open, standards-based development language for voice-driven solutions and is endorsed by the World Wide Web Consortium (W3C). GECP plans to use VoiceXML technology to improve customer care and service applications for CustomerNet because it provides speech-processing capabilities, such as speech recognition, text-to-speech, and voice authentication. Furthermore, VoiceXML enables application creation, supports system management, and provides administration capabilities. Another benefit of VoiceXML is that it is based on web architecture, not proprietary technology, which eliminates high costs associated with such proprietary systems.

Table 1: Functions Provided by CustomerNet.

- Place orders
- Check product availability and pricing
- Check order status
- Access GE product information libraries
- Create color, custom brochures
- Compare model features
- Review current account information including two year invoice database, account balance, draft status, and proof of delivery
- Order and check availability of parts
- Input and order extended service plans
- Access new product introductions and launch calendars
- Access training information
- Order point-of-purchase material

Improving SalesNet with a Wireless Technology

SalesNet is a website maintained to help support GE's sales teams by providing them with information on competition, GE specific directives, and pricing structure based on volume and types of client. The goal of SalesNet is to provide GE's and GECP's sales force with access to the most current information to assist them in contract discussions, to provide competitive product offering at a competitive price, and to take proper action to counter competitor's moves.

GECP is utilizing wireless technology that would allow its sales force to become more efficient, to have right information at right time to push for more customer contact, and to reduce the time spent on paperwork, a major objective of CEO Jeff Immelt. GECP is using *Good Technology* handheld devices as a means to communicate information between their sales force in the field and their national account managers, and to relay information to their customers on order status and availability. For example, a GECP's sales representative can walk into a Home Depot store anywhere in the US and retrieve what the store has ordered, what GE models should be on the store floor, and what the store's purchasing figures are for GE appliances on his/her handheld device. With the use of wireless technology, GECP's sales force can have instant access to information anywhere at any time to provide better service to customers that could provide GECP an advantage over its competitors. As of December 2002, the wireless project was in an evaluation period and GECP was moving towards full implementation. In talking with IT personnel at GECP in March 2003, the general feeling was that GECP is moving away from using the *Good Technology* handheld units because of hardware issues such as the small colorless screen. However, the management has not suggested what they will be using to replace these with.

Digital Prospecting Project and SalesNet

Digital Prospecting deals with supplying GECP's sales force with leads on potential new clients and/or new projects where GECP's products could be sold. Digital Prospecting will be incorporated within SalesNet and is currently in the development stage by a third party. Currently, the sales force must find new clients by keeping in touch with local building permits and potential store openings. With digital prospecting, such information would be provided to GECP's sales force and allow them to contact potential new clients and to sell GECP products without spending their time searching for prospective buyers.

MERGING GEA AND GEL INTO GECP FOR COMPETITIVE ADVANTAGES

Impact on Strategic Directions

Merging GEL and GEA supports GE Corp.'s corporate level strategy of growth. Because the consumer base is similar between the two business units, GE is in a better position to serve their customers, which in turn should generate more business and retain the current customer base. Having a similar customer base also allows for the development of new products that provides potential new customers for growth. After merging the two companies, collaborations would be more efficient and ideas could be shared more easily. As a result, GECP is both looking to serve current customers' needs better and to provide more value by new product development.

The merging of GEL and GEA also can strengthen the low-cost business level strategy to supplement GE's differentiation strategy and is projected to save between $25-$50 million dollars. The streamlining of operations and the reduction in costs should filter down to the consumer with cheaper products. GECP's customer service should also improve because centralized data on products and consumers would allow GECP to more adequately handle customer needs. The development of new products will not only allow GECP to grow, but also to differentiate by being the first to market. As GECP adds more products to its portfolio, it will continue to broaden the gap between GECP and its competitors. Initial Strength-Weakness-Opportunity-Threat (SWOT) analysis of Merging GEA and GEL into GECP is provided in Table 2.

Table 2: Initial SWOT Analysis of Merging GEA and GEL into GECP.

Strengths	Weaknesses
• Strong financial position • Technology and innovation viewed as hallmark of GE • Strong R&D • Excellent employee training and development • Strong upper management leadership • Clearly established goals and strategies • Diverse business portfolio • Culture of common values	• Integration is slow due to company size • Size decreases speed of communication • Internal changes in technology require new/updated employee skills and training • Resource management • Project planning
Opportunities	**Threats**
• Growth potential due to innovation and brand recognition • Globalization • Customer retention due to improved service through business webs • GECP can establish itself as the market leader in technology and innovation • Improved global communications with suppliers and customers • Pool of potential customers and suppliers expanded • Continued deepening and broadening of product lines	• Economic recession decreases consumer goods purchase • Increases in employee compensation (Cost of labors) • Increased competition

Furthermore, the VoiceXML project supports both GE corporate and business strategies by focusing on the customer. XML has been reported to be an important factor for gaining IT competitive advantage and to have significant impact on improving communication among customer, suppliers, and strategic partners of a firm (Wagner, et. al. 2004). VoiceXML can further support GE's business strategy in terms of low-cost leadership and product/service innovation. As mentioned before, most of the cost is made in web architecture instead of proprietary technologies, and savings are made by reducing the personnel needed to support customer service. GE Corp. continues to give their customers high-quality products at great prices because of their continuous drive to implement such technologies.

The speech recognition implemented by GECP enables customers to simply speak their requests to obtain the information they need. Speech recognition eliminates frustrating touch-tone menus and long hold-times and provides a faster and easier approach to communicating. Customer care is becoming a mainstay at GECP, and customer satisfaction should greatly improve with this new technology.

The corporate growth and customer centric strategies are also enhanced through the use of a wireless technology and digital prospecting in supporting SalesNet. GECP's sales force is equipped to handle a situation at a moment of notice, so real time information can be used on sales figures, customer inquiries that come over email, and any directives that account managers might have set for its sales force. Wireless technology not only provides the information when information is needed but it also allows the sales representative to perform his or her job more effectively and efficiently. This allows GECP to expand its business by being able to service more customers with the same quality of service. Digital prospecting will also give GECP a competitive edge over its competitors. By knowing earlier when a project is being undertaken, GECP's sales force can be the first at a potential customer's door.

Impact on GE Financial Position

At the end of 2001, GE Corp. had a drop in total revenues for the first time since 1994. Due to a decrease in operating expenses and costs, this decrease in revenues did not affect GE's earning power as net earnings were

$12.7 billion in 2000 compared to $13.6 billion in 2001. The integration changes being made at GECP are expected to help GE Corp. improving their financial position as a whole in the long term. GECP has projected to save between $25-50 million with this integration. In IT alone they are projecting to save $3 million. However, initial investments need to be made in order to realize these cost savings. In talking with Robert Barton, GE's Sales & Marketing Client IT Leader, he elaborated that GE has identified 800 processes that the two businesses have currently operated. Barton said, "GECP black-belts (experts) have found 20 programs out of the 800 that can be consolidated between the two divisions without incurring any cost. Another set, consisting of 80 processes, have been identified as having a medium consolidation cost of between $2-3 million to get the two businesses to function as one. Another set of 100 processes were identified as having a high consolidation cost of between $15-25 million. The leftover programs/processes, around 700, have been marked as processes that are linked to each business unit and cannot be consolidated." Even though these 700 processes will not be combined, some processes have been identified as possible candidates to receive a front-end that would allow the user to have a common interface with which to work from.

Projected integration costs are $2-$5 million for 80 medium-sized projects, and $15-$25 million for 100 major projects. These projects combined are projected to save GECP between $25-$50 million dollars after costs are considered. This integration supports goals of its parent company GE Corp. to continuously drive down costs, and these improvements will eventually have a positive impact on their operating margin and net income due to the decrease in operating expenses. By combining existing systems between GEL and GEA, GECP will have a decrease in total assets. This will result in a higher return on assets; although it will not have a significant overall effect because of the vast amount of assets held by GE Corp.

Initially, the changes being made at GECP will have a negative effect on their debt ratios. The debt-to-assets and long-term debt to equity ratio will go up. However, after a couple of years, when the debt has been covered, and if the assets remain stable, these numbers should level out and become better. It is unknown whether the debt for these projects will be absorbed by long-term debt or short-term debt. If short-term debt is used, it will have an effect on other financial measures such as current and quick ratios. However, it is assumed that an investment of this amount is absorbed by long-term debt. Additionally, as we stated in the in-progress report, GE Corp.'s short term borrowings is one of their problem areas.

GE Corp.'s financial position as of this writing has not changed. They continue to deliver in a tough economic situation. The integration of GECP will allow more streamlined operations and reductions in costs for the parent company GE Corp (Murray, 2002).

Impact on Existing Information Flows and Organizational Structure

With the directives of digitization as a key objective in its business, GE has solidified its commitment to information technology (Morone, 1993, Edelheit, 2002) to ensure its strategies and company as a whole are successful. GE invests millions to increase the speed of information across its entire business. Within GECP, the focus is to increase the speed of information by connecting Engineering, Purchasing, Marketing, and Customer Service with the use of information technology.

The existing major information flows within GECP are performed very effectively. In reference to how the information is communicated, GECP uses the Lotus *Sametime* software system. This tool provides the capability for online meetings on the GE intranet in addition to whiteboard capabilities, file sharing, instant messaging, and other online communication tools.   Although the major information flows and organization structure are not greatly affected by the implementation of ongoing projects from GECP, the information flows will be changed by creating a more streamlined process using tools such as VXML and other wireless applications. These tools will create an environment in which information transfer will be rapidly increased along with the cost savings of eliminating personnel and equipment that will no longer be needed. The organizational structure may not be greatly affected, due to the fact that the only changes will be to eliminate personnel who are no longer needed to handle phone calls at the GE Call Center.

Although the organizational structure may not be affected significantly, the flow of information will change in that it will be more centralized. Communication speed will be increased internally and externally. Essentially, when all the systems have been integrated, information will be more readily available for anyone with proper

authorization. As a result, response times to customers, suppliers, and consumers will be greatly improved.

Impact on IT architecture and control systems

GE has a balanced IT strategy which includes putting about 15 percent of its effort into technology development (developing advanced technology capabilities), about 15 percent into supporting immediate business needs (fire-fighting or problem solving), about 35 percent into developing the next generation of products and processes, and about 35 percent into getting ahead of the next generation of products or processes (Edelheit, 1998). By keeping ahead on IT-driven projects, GE is constantly trying to capitalize on technology, and by involving employees on every aspect of this transformation, GE has the potential to be rewarded for their creative input and success. The goals of GE and their IT projects fall in line with their mission, which is one reason why they are so successful.

With the merging of GEA and GEL into GECP, drastically different IT architectures create a very difficult situation when it comes to integrating the two divisions. For example, according to an interview in 2002 with Bryan Travis, IT Specialist for GECP, GEL is working with a commercial ERP system and Windows 95 and runs most applications from its ERP system to support GEL's business needs. On the other hand, GEA runs Novel/NT client server architecture and a Bull mainframe with many "homemade" applications. GEA has a Bull exit strategy to move off of its mainframe architecture. Robert Barton, GE's Sales and Marketing Client IT Leader, mentioned that the purchasing system within GEA is 27 years old and that the integration team has planned to move the entire division onto a Windows 2000 platform.

GECP's short-term and long-term blueprints reflects its mission and strategies by creating a customer value with speed and access that will create growth to address the corporate strategy and differentiation to address the business level strategy.   By using new technologies, such as VoiceXML and ERP systems, GECP can focus on a common customer base to learn from the previously separated customer bases and to attract new customers. In addition, due to being on the leading edge of technology, GECP will differentiate itself from the competition by the level of capabilities that it can provide. The changes to the IT architecture and control systems due to the merge and ongoing major IT projects are shown in relation from the short-term to the long-term blueprints and are summarized in Table 3.

Impact on Labor characteristics of IT function

Labor characteristics are always evolving at GE to reflect GE's strategy of performing like a small company. Technology is directly changing the labor characteristics by increasing the amount and speed at which information is available to customers and employees. These improvements allow GE to alter the flow of information that allows it to change, as a company, more quickly to react to the increasing rate of new technological developments that are critical to stay ahead of the competition.

Knowing who your potential customers are is critical to gaining business. GECP is currently implementing Digital Prospecting that will allow its sales force to identify potential customers and to concentrate on selling because it reduces the time they spend on searching for customers, and leaves that task for the Digital Prospecting technology. After the sales person finds the customer they can benefit from having information with them in the field. GECP is currently implementing SalesNet that allows a sales representative to meet the customer anywhere, whether it is in an office or at a construction site. With the wireless technology, the sales representative is able to search for a product, find information such as availability and pricing, and place orders from anywhere. Furthermore, Voice XML creates the ability to allow the use of the telephone without the need of a customer representative on GECP's side and is expected to reduce labor in customer service, although some technical personnel will be needed to maintain this new technology. With VoiceXML, GECP is eliminating the need for specialized software to connect to customers. Customers can now simply pick up the phone and make an order, check on available products, and/or check an order with an automated system through the use of Voice XML.

Table 3: Short-term and long-term IT Blueprint.

GECP	Short-term IT Blueprint (Feasible)	Long-term IT Blueprint (Desirable)
Structures	• The department that owns the project is responsible for allocation of payment. The hierarchy within the department determines the centralized responsibilities. The cost of capital investments will be $27 million for the integration and operating costs will decrease $50 million per year for GECP.	• The long-term blueprint for structures will assimilate the short-term blueprint. The cost of capital investments and the cost of implementation are subject to further integration. However, the operating costs will continue to decrease due to the streamlining of the business processes.
Processes	• Data is stored on an NT fileserver in GE's appliance park. This data is maintained on a secure intranet and updated by employees that have been granted access to this data. • Data is transported via Novel client/server architecture. • Data transformation involves the customized applications created by GEA prior to GECP, and purchased ERP tools previously used by GEL.	• Data storage and data transport will be similar to the short-term blue print. However, the data transformation will change due to the fact of combining all business processes to be used with one ERP system.
Tools	• GECP leases their PC hardware from Dell, which is a renewable contract on a 3 year basis. The standards for hardware reflect the needs of the system including software. • GECP uses Microsoft, Novel, and other main software manufacturers. With respect to applications GECP uses Visual Basic, Java, HTML, XML, VXML, and other high level languages. • Data inventory is maintained per application and respective procedural source.	• Due the fact of GE maintaining a leadership role in their industry with respect to technology; software, hardware, and data inventory will be updated with respect to the available technological capabilities.

The changes of the labor characteristics noted above are all enabled by the use of IT. All of these changes are directed to make GECP a company that can react quickly and that can increase the quality of its everyday business processes. It is expected that more labor will be concentrated in IT, due to the heavy investment in new and ever-changing technologies in the future.

Impact on Control and Reward Systems

At GE, the parent company of GECP, IT project ideas are generated from reverse auctions and business ideas. A project that is found to satisfy a business need and to provide business value receives a champion, owner, and manager. GE recognizes that, for an e-business strategy to succeed, an e-business champion who is part of the senior management team is essential and should sponsor the implementation process (Morone, 1993; p.29, Kalakota, 2001). The project champion is a company executive who is usually a non-IS person with extensive knowledge on the requirements of the specific project and have expectations and a visualization of how the project should progress. A project champion supports the project by providing time, resources, and political support within the company to make sure decision makers know the benefits of the project. The owner is the entity or division, such as

sales, marketing, or accounting, that owns and controls the project and has the ultimate ability to decide how or if the project will progress. Any modifications to a project require the consent of the project owner. The project manager is a facilitator to make sure that the team can do its job; he/she works with management, supplies the team with the necessary resources, and resolves any problems the project team is having.

The project will begin once the necessary resources are available and will then be analyzed to determine whether to use business process outsourcing (BPO) or to develop in-house (Edelheit, 1998). One advantage of keeping the IT knowledge in-house is that the company does not have to rely on contractors if problems rise or additional work is needed; the company has retained the knowledge inside the company (Kalakota, 2001). If BPO is used, contractors would take over the development. A contractor is an outside entity that specializes in a type of technology or business procedure that is required to complete the project. Often, contractors can complete the necessary work more quickly and less expensively than could be achieved through in-house development (p.50, Kalakota and Robinson, 2001). Currently, most of the technical work (such as programming) is done by the GE employees in India. BPO also allows GE to enter or create new markets considerably faster.

There will be a significant increase in user involvement with the merging of GEL and GEA. For example, the centralization of information between the two companies allows GECP to better identify their most profitable customers and to increase selling opportunities. Therefore, Sales and Marketing will have more involvement in the implementation and use of the system. Data will be more accurate and easier to access, which means more involvement with top management to make well-balanced and informed decisions. Service and support personnel will have more information to work with to help customers. All users will have more integrated or new applications. Each will affect the integration IT wise and will have a ripple effect throughout the company. Users including suppliers and customers will need more training and be expected to use the information at hand to increase their involvement in the company. The user involvement will increase significantly with the Digital Prospecting technology. The sales force will interact continuously with the digital prospecting to increase their customer base and grow GECP's business. Digital prospecting will also give GECP a competitive edge over the competition. By knowing earlier when a project is being undertaken, GECP's sales force can be the first at the potential customer's door.

GECP's reward system supports GE Corp.'s, which bases rewards on level of performance. Although this will not change after merging, a user's expertise in these IT tools for integration will become very important. As new IT tools are implemented it is up to the employees to learn the systems, become proficient, and take advantage of available opportunities. Given the fact that there is more demand than supply for most IT jobs, this provides an even better opportunity to take advantage of reward systems for personnel.

Digital prospecting will have significant impact on the reward system of GECP. Before the implementation of digital prospecting, the sales representatives could be compensated by the number of new customers they discovered and brought on board not having even sold anything to them yet. Although digital prospecting does provide the sales representative with more leads and opportunities, the sales representative now needs to close the deal with customers. The sales representative will probably be expected to make more sales to reach the commission rate that they had before. These factors make the sales job easier and more rewarding in some respects and tougher in others. There is also a learning curve that the sales force must overcome. In viewing the technology and the age of the sales force being relatively young within GECP, this is not expected to be a major hurdle. A summary of strategic implication is provided in Table 4.

ALTERNATIVES FOR INTEGRATION

Although merging GEA and GEL into GECP provides competitive advantages, the major decision facing GECP is the integration approach that it should take to integrate the two divisions because of their radically different IT architectures. Should they go with the commercial ERP route of GEL, where the cost savings is sometimes hard to identify because of the expense of the implementation and application development (Robinson and Wilson, 2001; Kalakota, 2001), or do they embrace what GEA has in their mainly homemade applications? Four alternatives identified are:

- Full integration of GEL and GEA processes and applications to a commercial ERP suite.
- Full integration of GEL and GEA using all customized applications.
- Modular integration of GEL and GEA for selected processes considered to be strategic.

- Keep GEA and GEL applications in their existing forms as separate entities.

Analysis of the four alternatives are derived based on how each alternative will embrace strengths, eliminate weakness, capitalize on opportunities, and neutralize threats (SWOT analysis), as well as its impact on the potential of new entrants, rivalry among existing firms, bargaining power of suppliers and buyers, and substitute products (five forces analysis) of GECP. Summaries of SWOT and five forces analysis are provided in Table 5 and Table 6.

Table 4: Summary of Strategic Implication.

	Merging GEA and GEL into GECP	**VoiceXML Project**	**Wireless Technology Project**	**Digital Prospecting Project**
Impact On Strategic Directions	• Support corporate strategy of growth • Strengthen low-cost business level strategy to supplement GE's differentiation strategy	• Supports customer centric corporate strategy • Supports business strategy of low-cost leadership by utilizing web architecture and reducing personnel needed to support customer service.	• Support the growth and customer strategies via effectiveness and efficiency	• Support the growth and customer strategies • Create values from utilizing differentiation strategies
Impact On GE Financial Position	• Long-term overall saving is projected to be between $25-50 million	• Cost savings of eliminating personnel	• Values from improved customer service	• Potential more sale opportunities
Impact On Existing Information Flows And Organizational Structure	• More centralized flow of information • Speedy internal and external communication	• Creating a more streamline process • Speedy information transfer	• Creating a more streamline process • Speedy information transfer	• Creating a more streamline process • Speedy information transfer
Impact on IT architecture and control systems	• Integration of two different IT architectures (structures, processes, and tools)	• Changed business processes, hardware, software, and storage requirement	• Changed business processes, hardware, software, and storage requirement	• Changed business processes, hardware, software, and storage requirement
Impact on Labor characteristics of IT function	• Technology is directly changing the labor characteristics by increasing the amount and speed of which information is available to customers and employees	• Eliminate the need of customer representative • More skilled IT personnel and equipment	• More skilled sales forces • Enable sales force to provide real time information for customer	• More skilled sales forces • Enable sales force to identify potential customers and to concentrate on selling
Impact on Control and Reward Systems	• Increased user involvement and training needs because of centralized information and data availability	• Fewer customer representatives to answer customer calls.	• Increased user involvement and training needs	• Increased user involvement and training needs • Potential more leads and sales opportunities • Changes in commission scheme.

Table 5: SWOT Analysis of Alternatives.

Alternative	Strength	Weakness	Opportunity	Threat
Full integration of GEL and GEA processes and applications to an commercial ERP suite.	• Consolidates and unifies relevant business functions • Integrates a broad range of technologies • Has new technological foundation to support next generation e-commerce applications • Significantly reduces R&D and development costs of an ERP system • Utilizes expertise of commercial ERP vendors to free up IT resources for other strategic development	• Very expensive up front implementation cost • May require significant business process redesign • Limited flexibility due to not having customized applications • Will lose technical expertise on their system • Dependency on supports of vendors and subcontractors	• Improved communications with suppliers and customers due to having a standardized system • Expanded customer base due to integration of GEL and GEA • Improved customer service from streamlined processes and new technologies • Further deepen the technology gap between GECP and its competitors	• CECP might face common implementation difficulties and failures as other successful ERP adoption firms • Using a commercially available ERP system would make it easier for competitors to replicate • It may cause incompatibility issues with current suppliers' or customers' systems who are using applications previously developed by GEL or GEA
Full integration of GEL and GEA using all customized applications.	• Will have expertise of developed system • Streamline applications due to not having to include all modules of standard ERP systems • Up front cost will be minimal • System will be flexible to needs • Business processes may not need significant redesign compared to implementing a commercial ERP system	• The change of culture for GEA to move from standard to customized applications • Longer implementation time • Higher R&D and implementation costs • Uncertainty of success • Untested technologies • Inability to move to new technological foundation to support next generation e-commerce applications	• The ability to produce a system that will function more efficiently than standard ERPs which streamline business processes to increase customer value • More flexible to communicate to customer and supplier systems	• Incompatibility with current suppliers' or customers' systems that may use a standard ERP system • Possible system incompatibility may cause potential customers to go elsewhere and lose market share • The lengthy implementation time might open a door for competitors and new entrants to catch up with GECP's technology advantages

Table 5: SWOT Analysis of Alternatives (continued).

Alternative	Strength	Weakness	Opportunity	Threat
Modular integration of GEL and GEA for selected processes considered to be strategic.	• Will be able to focus on key areas of implementation that are more critical to the business process. • Up front cost will not be as significant as implementing a commercial ERP system. • Reduced culture shock due to implementing on a micro level rather than being all-encompassing. • Prototype testing ability.	• Will create redundant business applications while using parallel system. • Implementation time for the complete system will be extensive. • Likely customization of individual modules that may cause integration problems with others.	• Modular implementation has a lower risk of causing system-wide downtime that might affect customer satisfaction. • It will allow development time for customers and suppliers to adapt to new system requirements.	• By the time the entire system is implemented it may be outdated to that of customer and supplier systems, as well as current ERP technologies. • May loose competitive advantage to rivals that will have already implemented an ERP system and, as a result, lose market share. • Processes that are not integrated might become strategically important later. As a result, GECP might lose competitive advantage to competitors that implemented a full integration
Keep GEA and GEL applications in their existing form as separate entities.	• No cost of implementation. • Expertise in existing technologies. • Existing employee buy-in of technology and processes. Employees can stay in psychic prisons with no fear of change.	• Lack of integration creates the inability for GEA and GEL to focus on their combined customer base as a whole. As a result, customer service and support may be negatively affected. • Inability to move to new technological foundation to support next generation e-commerce applications. • Redundant business processes will exist.	• The ability to retain existing suppliers and customers due to the familiarity with existing systems. • Future ERP systems may be developed that will be more easily implemented or more suitable than current systems that are available.	• As rival companies, suppliers, and customer technologies evolve to standard ERP system, GECP may encounter difficulty to integrate or communicate with their systems. • Rival companies, suppliers, and customers who deal with business processes of both GEL and GEA will need to have systems that are compatible with both systems creating possible redundancies and needs of custom applications. • GECP might lose market share to competitors that provide better customer service and products from better integration attempts.

Table 6: Impact on Five Forces of Alternatives.

Alternatives	Potential of New Entrants	Rivals Among Existing Firms	Bargaining Power of Suppliers	Bargaining Power of Buyers	Threat of Substitute Products
Full integration of GEL and GEA processes and applications to an ERP.	It will create a high entry barrier due to the up front capital investment of ERP system. Also included into this is the fact of the current market share of GECP and brand name recognition in its industry.	Although competitors could easily replicate GECP's processes by purchasing a similar ERP system, advantages from early implementation would create a higher barrier among existing firms.	It would remain low due to GECP's strong influence on suppliers and could become even lower as GECP gains more market share from improved process and customer service due to ERP integration.	Improved customer service from ERP-streamlined process could offset the high bargaining power of buyers who have many competitors to choose from.	It will create an even higher barrier for substitute products due to streamlined processes, improved customer service, the nature of the product and the market in which it exists.
Full integration of GEL and GEA using all customized applications.	It will result in a certain degree of entry barrier due to the development of the customized applications that have been previously developed. However, the length of such early development advantage could be offset by the length of development time required by customized applications.	This would also be high because competitors would still have intense competition due to the fact of available technologies that would compete with these customized applications. Competition might become more intense if competitors adopt a commercial ERP system quickly and successfully.	It would remain low because of GECP's strong influence on suppliers. The power of suppliers could become lower as GECP gains more market share from improved process and customer service due to full integration, but it might take longer time than implementing a commercial ERP system.	Due to the fact that there are many competitors to choose from, the bargaining power of buyers will remain high. The power of buyers might be offset when all custom applications are fully implemented and error free, which might take a longer time than implementing a commercial ERP system.	The length of time needed to implement all customized application could induce threat of substitute products, although the threat is currently very low due to the nature of the product and the market in which it exists.

Table 6: Impact on Five Forces of Alternatives (continued).

Alternatives	Potential of New Entrants	Rivals Among Existing Firms	Bargaining Power of Suppliers	Bargaining Power of Buyers	Threat of Substitute Products
Modular integration of GEL and GEA for selected processes considered to be strategic.	Previously developed custom applications may create a lower degree of entry barriers at the beginning, but would eventually be offset by new entrants with more mature and integrated ERP implementations.	This would also be high because competitors would still have intense competition due to the fact of available technologies and would become higher if competitors have full integration to streamline all processes and to improve customer service.	Due to GE's strong influence on suppliers currently, suppliers' bargaining power would remain low but could grow higher as more competitors and new entrants become available.	The bargaining power of buyers will remain high due to the fact that there are many competitors to choose from.	The length of time for custom applications and the lack of full integration could induce threat of substitute products, although the threat is currently very low due to the nature of the product and the market in which it exists.
Keep GEA and GEL applications in their existing form as separate entities.	If GE sticks to what they are doing now they will open the way for new entrants, although it is currently tough for new entrants because of the brand name recognition and the market share of GE and its competitors.	This would remain high at the beginning but would become higher and more intense as competitors embrace to new technology and become more integrate than GEA and GEL.	This is currently low because the suppliers would still need to comply with both the customized system of GECP and the standardized system of GEA.	Because there are many competitors to choose from, the bargaining power of buyers will remain high at the beginning and could grow even higher when GECP's competitors catch up with GECP's technologies or new entrants enter the market at a later time.	If GE sticks to what they are doing now they will open the way for substitute products, although the threat of substitute products is currently very low due to the nature of the product and the market in which it exists.

Furthermore, there are three key variables that have to be accounted for in selecting an integration alternative: time, resources, and people. This is due to the profit margin being at such a low level that any inefficient allocation of time, resource, or people will have a direct impact on the bottom line.

RECOMMENDATIONS FOR ALTERNATIVES SELECTION

Based on the analysis that has been performed during the development of this report, it is recommended that a full-scale commercial ERP system implementation alternative would encompass the needed business processes, and it has outweighed the other alternatives because of several key reasons. One is that the implementation time is expected to be shorter than that of developing, testing, and deploying its own customized ERP applications, which will affect the cost of training and as well as other implementation costs. Another advantage of full integration using a commercial ERP system is that it would significantly reduce the R&D and development costs needed for developing a customized ERP system or selected processes. With utilization of expertise from commercial ERP vendors, IT resources could be freed up for other strategic development.

Although full integration to a commercial ERP suite has expensive up front implementation cost, and limited flexibility in application customization compared to the other three alternatives, it also creates a higher entry barrier for new entrants due to the up front capital investment of a commercial ERP system, lowers competition among rival firms through a deepened technology gap between GECP and its competitors, decreases the bargaining powers of suppliers and buyers through more streamlined processes and improved customer service due to ERP integration, and the reduces threat of substitute products when taken into consideration of the current market share, brand name reorganization, and technology advantages of GECP in this industry.

Furthermore, this recommendation is derived to support GECP's strategy of future growth and differentiation due to the fact that it will consolidate and unify relevant business functions effectively and efficiently within a limited time, integrate a broader range of technologies, improve communication with suppliers and customers by using a standardized ERP system, and provide a new technological foundation to support next generation e-commerce applications. As a result, the full integration of adopting a commercial ERP system will support GE's mission by improving performance in customer service and the way employees perform their jobs, playing offensively to embrace speed and excellence, and embracing changes to achieve global focus.

Competition led corporations to strive for technological and managerial innovation (Thurow, 1986, p.139). GE's philosophy of staying on the leading edge of technology, along with having optimal process improvement tools available, has established the company as a benchmark for most companies, as well as its subsidiaries, in relation to IT projects and implementation. GECP as well as its parent company GE are examples of how a large company could operate and integrate effectively and efficiently to gain competitive advantages from utilizing various information technologies. As illustrated in this study, several IT projects, such as VoiceXML, wireless technology, and digital prospecting, being implemented enable greater knowledge sharing and movement between previously independent GEL and GEA, result in a smoother merging process into GECP, and provide a streamlined approach to business integration using current technologies, such as adopting a commercial ERP system, as well as preparing for future technologies in order to gain competitive advantages.

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