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BUSINESS INSIGHTS

A COLLEGE OF BUSINESS RESEARCH JOURNAL

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In This Issue

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BUSINESS INSIGHTS

A COLLEGE OF BUSINESS RESEARCH JOURNAL

The College of Business at Athens State University is dedicated to providing students with the education and opportunities that will prepare them for professional positions in business, finance, or government by enhancing their skills in research, communication, technology, ethics, and critical thinking. The Athens State University College of Business Student Research Journal is now in its ninth year of publication and is designed to support and encourage excellence in undergraduate and graduate research and writing in all areas of business and to provide a vehicle for the dissemination of quality research studies by Athens State University students.

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With the ninth issue of the Research Journal, we are continuing to expand the exceptional work done by Athens State University College of Business students and faculty as they pursue their educational journey and begin or continue their professional careers. We would like to invite you to join us in this venture.

Sincerely,

Charles R. Roberts
Editor-in-Chief

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- Papers must be written by students (either individual or groups) enrolled at the institution.
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- The author is responsible for guaranteeing that no material in the paper infringes on existing copyrights.
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- Papers must be submitted by email to Dr. Charles R. Roberts (Charles.Roberts@athens.edu).
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- Papers will be reviewed by three reviewers using a double-blind process.
- Papers will be evaluated based on strength of the thesis, clarity of concepts, demonstrated knowledge, and quality of empirical/documentary research, use of relevant visuals, grammar, and format.
- Students and faculty sponsors will be contacted when each paper is received and again after the review process is complete.
- The faculty sponsor will be identified on the published paper, separately from the student author(s) and any co-authors.

Format guidelines

- Papers are limited to no more than 25 pages, not counting the title page, abstract page, and list of references.
- Papers must be typed, using 12 pt Times Roman, and double-spaced, with 1" margins on all sides, using Microsoft Word.
- Papers must conform to APA format.
- Each paper must include an abstract (150-250 words).
- All pages must be numbered and have a running head (shortened form of title).
- The title page must include the paper title, full name of each author with email address, phone number, and mailing address, and name of the faculty sponsor with contact information.
- Names of the author(s) and faculty advisor should appear ONLY on the title page.

Managing Contracts: A Case Study

Dr. Charles R. Roberts
Professor of Management with emphasis in Acquisitions and Contract Management

ABSTRACT

This case study has been conducted to identify and analyze the ineffective and inefficient practices within the Department of Defense (DOD) contract management process. The research for this project utilized both secondary and survey analyses to pursue the formation of hypotheses and evidence-based solutions. An analysis of fourteen secondary sources was conducted in conjunction with a survey that netted 156 respondents, from both government and contractor entities, of eight carefully constructed questions regarding the contract management process. The results of the secondary analysis and corresponding survey responses showed several problems within the DOD contract management process. The problems identified were excessive fraud, waste and abuse, deficiencies in workforce training and development, improper employment of contract types, enlistment of contract services when DOD personnel can handle the work, inadequate contractor reporting requirements and overfunding.

Introduction

In both government and private sector contracting, the effective management of contracts is imperative to the sourcing process. Contract management is utilized by contracting agencies to certify that obligations are met and expectations negotiated in the agreed upon contract are being met at a satisfactory level. Contracting professionals ensure that these obligations are carried out in a cost efficient manner that minimizes fraud and misallocation of expenditures. In government contracting, this is especially important as active contracts cover a wide range of activities including cyber security and weaponry procurement and the delivery of armed forces operations support. These activities are critical to the safety of our nation and must be heavily monitored. Failure to ensure compliance with set forth contracts by the Department of Defense (DOD) would lead to the potential infiltration of U.S. defense systems and cause vulnerability to physical and cyber attacks. Insolvency to adhere to monitoring service level completion in contracting can be exemplified in the form of failure to have proper certifications to fulfil a contract. Consequences include safety and/or accuracy complications that could prove detrimental for the DOD. Resistance to implementing contract management affects the fiscal wellbeing of the U.S. government as it causes widespread inefficiency in the allocation of resources. With funds tied up in outdated contract renewal, operations that require special attention in order to promote corporate goals will be underfunded. This can lead to the steady decline of an organization as money is continuously left on the table.

To safeguard agency interests and add value to the company's contractual agreements, an organization must evaluate their level of participation in managing contract procedures. To find this point of involvement, assessment of several factors can be evaluated. Executives can start with the following questions to create a concept of the extent contract management exists:

- What is the total value of current contracts?
- Which are key contracts per division?
- How much time has been spent with current suppliers?
- Who/How are requests for new suppliers made?
- How often are there meetings with suppliers?
- Which contracts are renewing weekly, monthly, quarterly, and yearly?
- Who has access to view contracts? When were they last accessed?
- Are we on track to meet all service levels set?

These questions serve as the first steps in managing contracts efficiently. After considering the answers to these questions, there will be a new view of transparency in operations. Agencies will reflect upon new, retiring, and current contracts and evaluate their impact on organizational effectiveness. This information is vital in reflecting if there must be changes made to the current process in efforts to attain desired results.

Statement of the Problem

In many contract agreements, the majority of efforts are fueled into the conciliations required to actually obtain the contract. It is often noted that after terms have been agreed upon, few reflections on the terms of the contract occur. This poses a problem for corporations as they are funneling large amounts of funds through legal fees, human capital, and resource time into the negotiations process, only to not follow up on the status of the conditions that are to be met and at what price. With this observation in mind, it is important for corporations to ask questions concerning the status of the contracts in place. Is there a procedure to monitor service levels? Are service levels being met as agreed upon in the contract? What contracts are currently active? What value do currently active contracts add to the organization? What contracts are up for renewal? What contracts or areas of concern should receive corporate attention? By analyzing the results of these questions, companies should have a clear understanding of their degree of implementation of managing contracts and how to strategically utilize contract management within the corporation.

The significance of successfully implementing contract management processes is to identify key areas where negligence has occurred in the fulfillment of a contract in order to

- Minimize risk of large monetary penalties and other legal consequences stemming from lack of compliance with federal regulations
- Provide visibility into current agreements and identify which current contracts negate value from the company
- Ensure onboarding of suppliers operating under valid certification expiration dates within low risk zones in terms of physical and economic certainty
- Eliminate spending on outdated contract renewals
- Allocate appropriate amount of resources to key project departments based on company objectives

These objectives are critical to organizational productivity as they directly affect a company's return on investment (ROI) and overall proficiency. Without monitoring the agreed upon terms post contract awarding, a company puts itself at risk of letting important aspects of the contract fulfillment fall through the cracks, resulting in major cuts into fiscal budgets and operating efficiency. For example, many agencies utilize information technology applications and equipment to manage physical and cyber security as well as compile, audit, and manage information required for daily processes. In these cases, it is found that corporations were acquiring information technology (IT) equipment from the same agreements that were negotiated years prior. IT is a constantly evolving industry resulting in new technologies that can periodically increase service levels at lower costs. These companies who do not manage contracts effectively, consequently, mismanage budget allowances by supporting equipment that other IT suppliers would support at a much lower cost. As a result, the corporation's ROI is negatively impacted. To expand upon this, companies who do not establish a contract management process to reflect upon current agreements fail to have basis to monitor if service levels are being met. They are unable to validate that the supplier is honoring the agreement as outlined in the contract and whether the supplier has maintained the credential to do so. As a result of this fraud, the company is now subject to fines authorized by the FSAA. The company also risks safety and quality control levels to drop, harming production. Also, government agencies are required to select a specific number of suppliers that are led by certain subgroups. Failing to review current and renewing contracts to see if this qualification is met is in direct opposition to the SBA, which results in monetary forfeits.

Research and Results

The research conducted for this project is a partial fulfillment of mandatory curriculum required for the researcher to obtain a Bachelor's of Science in Acquisition and Contract Management. Due to the basis of the research conducted, this project proves beneficial to the core competencies and understanding of managing contracts upon the researcher's introduction to the workforce. The setting of the research was Huntsville, Alabama, with the majority of the review executed at the Huntsville-Madison County Library. Due to the limited number of physical content available for review, resources containing subject matter in areas of contract management, contract administration and strategic management were found utilizing library and online databases. School resources such as Alabama Virtual Library and online databases available through Kares Library at Athens State University were also utilized. The researcher will provide analysis on the sources collected and other material reviewed during the research process. The data found will reflect the impact managing contracts has in mitigating risk, conserving resources, and driving competitive advantage in a company. The data found in this project will also create a base to which more research can be conducted to further assess the effect of contract management in the contracting field. It is important to continue the research into the results of contract management implementation.

An analysis of fourteen secondary sources was conducted in conjunction with a survey that netted 156 respondents, from both government and contractor entities, of 10 carefully constructed questions regarding the contract management process. Each survey question is provided below with accompanying survey results and analysis of the responses. All 10 questions provided a choice of "yes" or "no" as a response.

1. **Are the procedures for detecting contract risk current?** This question was selected in order to define the level of efforts applied toward research and revision of contracts. It is also one of the first questions a corporation must ask to find the level of implementation managing contracts exists in their organization. The results show all (100%) of professionals solicited felt procedures for monitoring risk were up to date.

2. **Does increased federal regulations increase the ability to manage contracts efficiently?** This question was asked in order to gauge if federal regulations positively or negatively impact the effectiveness of managing contracts. A total of 56% of survey takers felt as if government regulations are beneficial and serve as a guideline when managing contracts; while 44% felt as if increased government regulations negatively impacted managing contracts.

3. **Has current contract management processes proven effective in the credit union [Redstone Federal Credit Union]?** This question was chosen in order to determine if legal professionals felt as if the processes used in managing contracts were effective in accomplishing the goal set by the credit union. The results reflect that 78% of professionals felt their current contract management processes were successfully implemented. In opposition, 22% did not think current contract management processes were effective.

4. **Does technology enable the contract management process to flow more effectively?** This question was chosen in order to gain perspective on the professional's utilization of technology when managing contracts. It is also one of the initial questions a corporation must consider when assessing if contract management practices are currently in place. After analyzing the results of the completed assessment, it was found that 100% of participants found that technology was a critical tool in allowing key functions involved in post award and procurement processes.

5. **Does RFCU provide helpful tools (manuals, training, templates) for effectively managing contracts?** This question was chosen as it ties together the notion that companies who invest in contract management processes see success in onboarding company wide. Results show that 78% of professionals felt as if RFCU adequately provides them with training resources needed to manage contracts, while 22% did not.

6. **Does outsourcing some contracting duties promote efficiency in managing contracts?** This question was asked with the intent of gaining understanding of what contract management priorities may exist in the credit union. By knowing if the task of

managing contracts is better off carried out by a third party, to what areas can the freed up resources be redirected? In response to this question, 89% of respondents believe some aspects of managing contracts are best carried out by a third party, while other efforts are prioritized.

7. **Does automatic renewing of contracts add value to the company?** This question was asked with the intent of determining what factors legal professionals consider when establishing what contracts should remain active. This question also gives insight into what types of contracts are most beneficial when renewed automatically. All (100%) of the respondents felt as if automatically renewing contracts did not add to the value of the credit union. This unanimous response implies most professionals find value in renegotiating or finding new suppliers to enter contracts with rather than automatically renewing.

8. **Are performance measures in place for service providers?** This question was asked due to it being a crucial question considered when examining the extent current contracts are managed. It also sets a standard of maintaining accurate visibility of post award activities. All (100%) of respondents felt as if vendors and the credit union are aware of the service levels as negotiated.

9. **Do you know your options for exiting a contract where the supplier has failed to meet service levels?** This question was asked in order to access if the professionals were able to rectify situations where service levels are not being met post contract award. This question is also among those to be considered after evaluating current contracts and their fulfillment status. One hundred percent of professionals solicited felt certain of their knowledge of options for exiting a contract service where service levels are not met.

10. **Is there a history of contract management processes having problematic results?** This question was selected as it helps determine if managing contracts is a worthy expenditure. If a multimillion dollar banking institution benefits from implementing a contract management process, then the undertaking of establishing managing contract procedures may be beneficial for other corporations. This question received 89% of responses stating that professionals saw no issues when managing contracts; while 11% experienced difficulties.

The results of the secondary analysis and corresponding survey responses showed several problems within the DoD contract management process. The problems identified were excessive fraud, waste and abuse, deficiencies in workforce training and development, improper employment of contract types, enlistment of contract services when DoD personnel can handle the work, inadequate contractor reporting requirements and overfunding.

Conclusion

As outlined throughout the research, by neglecting contract management practices, a corporation has the potential to implode. This is due to a failure to allocate resources to areas where they are needed, as they are tied up in contracts that subtract from the company's goals. In order for a corporation to maintain operations and achieve desired results, it is important to address the level of participation in contract management processes company wide.

It is important to continue the research into the results of contract management implementation in order to create solutions that target issues concerning increasing debt, quality control levels, and compliance with federal regulations. These solutions can positively influence companies and their ability to carry out tasks that are critical to project support.

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The Application of Operations Management During the COVID-19 Pandemic: A View of Three Service Industry Sectors

Dr. Kim Roberts
Associate Professor of Operations Management

ABSTRACT

The age of COVID-19 has brought new challenges to operations management for many industries. Many companies have had to reconsider their competitive position and order winners, re-evaluate their process design analyses, and redesign their service systems. This paper explores the impact of COVID-19 on service design strategies and capacity planning management in service industries such as hotels, restaurants, and theme parks. Many of these firms were already in the process of making changes to health and safety protocols even before the pandemic. Many plan to retain these changes afterwards because they leverage the firm for future operational success. In a post-pandemic world, successful firms will continue to evaluate their systems and make changes and improvements. Whether from emerging technological innovations, shifts in customer preferences, or something as significant as a global health pandemic, successful firms will continue asking themselves what can be done differently and what can be done better.

Introduction

COVID-19 has brought new challenges to operations management for many industries. Operations and supply chain management encompasses the "design, operation, and improvement of the systems that create and deliver the firm's primary products and services" (Jacobs & Chase, 2021, p.3). Many companies have had to reconsider their competitive position and order winners, re-evaluate their process design analyses, and redesign their service systems. This paper explores the impact of COVID-19 on service design strategies and capacity planning management in service industries such as hotels, restaurants, and theme parks.

The Hotel Industry

COVID-19 Impacts

Data released in April 2020 by the American Hotel & Lodging Association (AHLA) revealed the pandemic's severe impact on the lodging industry. The key findings on occupancy include:

- The COVID-19 impact is nine times worse than that of 9/11.
- A 50% revenue decline is projected for 2020 with $124 billion lost off the $270 billion total for 2019.
- Eight in 10 hotel rooms are empty.
- Hotel occupancy for 2020 is projected to be the worst on record.

Key findings from job loss data reveal:

- A staggering 70% of hotel employees have been laid off or furloughed.
- Since the crisis began, nearly 3.9 million hotel-supported jobs have been lost.

According to Chip Rogers, President and CEO of AHLA, "Hotels were one of the first industries affected by the pandemic and will be one of the last to recover" (AHLA, 2020, para. 3).

Strategy and Policy Changes

To survive the current environment and thrive in a post-coronavirus age, the hospitality management industry must reposition itself. Industries such as these are now reconsidering core competencies and order winners, dimensions that differentiate a product from the competition (Jacobs & Chase, 2021). For example, Hilton has now created an alliance with Lysol and the Mayo Clinic's Infection Prevention and Control team to reposition around a core competency of clean and safe (Durbin, 2020).

These redesigned strategies and services are resulting in new policies. High customer contact points, such as the front desk, must now convey friendliness without the visibility of a smile due to wearing masks. Hilton is considering adopting a gesture, such as a hand over the heart, to signify customers are welcome. Furthermore, cleaning tasks typically performed behind the scenes will now occur more frequently and with more visibility. Other hotel traditions face change as well. The buffet will likely be completely replaced with popular items in sealed bags, placed in grab-and-go areas (Reynolds, 2020).

Wynn Resorts is considering operational changes such as thermal cameras at entrances to conduct noninvasive temperature checks. Elevators would be limited to a maximum occupancy of four, with buttons being sanitized hourly (Wynn Resorts, 2020). Marriott's cleaning measure policies include electrostatic sprayers with hospital-grade disinfectant and possible ultraviolet light technology for cleaning (Marriott International, Inc., 2020).

Impacts on Capacity

What will be the impact of these new policies on service capacity, particularly in terms of staff? As travelers return in a post-coronavirus age, it is hard to gauge whether more or fewer workers will be needed. With these changes in cleaning programs, some activities, such as thorough cleaning of high-touch areas, will increase (Spencer, 2020). However, some of the new cleaning technology under review may require less human labor. Furthermore, some lodging locations are considering having rooms cleaned only after guests check out and not during the customer stay (Reynolds, 2020).

Having more food pre-packaged, and possibly even more delivered to guest rooms, could suggest more food prep workers and servers might be needed. Front desks could still be staffed by workers to provide human interaction with guests as they arrive. But many hotels now employ systems that let guests check in using their phones and use their phones for

key access (Reynolds, 2020).

How will new hotel policies affect capacity planning and occupancy rates? Hotel rooms were only about 20% occupied as of April 2020 (AHLA, 2020). As hotels reopen and customers return, hotel facilities may not operate with the same maximum occupancy rate as pre-COVID days. For example, Airbnb announced a policy in which guest rooms must be left vacant for a minimum of 24 hours between guests (Reynolds, 2020). Depending on the typical length of stay and the required waiting period, a hotel's effective capacity could be significantly reduced. New policies could make it difficult for some lodging locations to stay profitable because, whether the facility is 100% occupied or only 20% occupied, fixed costs still must be paid (Spencer, 2020).

The Restaurant Industry

The restaurant industry has not been shielded from the ipact of COVID-19 either. According to a survey from the National Restaurant Association, "Millions of jobs have been lost, and nearly 100,000 restaurants have closed permanently or indefinitely since the outbreak" (Carman, 2020, para. 5). Financial data indicate a nearly $240 billion loss for restaurant businesses (National Restaurant Association, 2020). Furthermore, outdoor dining spaces, which some restauranteurs used in order to keep their doors open, are threatened with the approaching winter season.

On the other hand, consumer behavior during the pandemic indicates visits to drive-throughs increased 26% in April, May, and June of 2020. Financial data from Taco Bell's second quarter indicate 4.8 million more cars frequented drive-through lanes compared to the previous year (Lucas, 2020).

New Designs

The three elements of Lee's (2021) Triple-A Supply Chain are agility, adaptability, and alignment. This expanded view of the supply chain has forced businesses to take responsiveness and flexibility within their organizations to higher levels during the battle against the coronavirus pandemic. The newest design features for Taco Bell chains include dual drive-through lanes and designated parking spots for the now popular contactless curbside pick-up. The Burger King chain unveiled a new design that reduces square footage by 60% compared with traditional Burger King restaurants. The new design boasts: up to three drive-through lanes with one designated for delivery drivers, a two-floor space plan in which the kitchen and dine-in area jut out above drive-through lanes, a walk-up window for to-go orders, and parking spots for curbside pickup (See Figure 1). As a final example of layout changes prompted by the pandemic, Starbucks intends to build more mobile pickup cafes in 2021 than originally planned (Lucas, 2020).

Impacts on Operations Management

These new designs address several order qualifiers for restaurants such as delivery speed, quality, and flexibility. A major order qualifier of delivery speed will require higher throughput of filled orders and waiting line analyses to achieve the higher throughput goal. A focus on quality may drive managers to increase consistency and reduce variability with methods such as Lean Six Sigma, traditionally employed in manufacturing organizations. If flexibility is a sought-after order winner, organizations will need capacity flexibility—the ability to quickly shift from one service to another. Organizations would need to employ flexible processes and flexible workers who require broader training to perform multiple tasks (Jacobs & Chase, 2021).

Even if some restaurants can operate with outdoor dining spaces, owners must still consider the break-even point. Fixed costs such as rent, insurance, utilities, or property tax can be very high. It is estimated that 85% of seats need to be filled to cover fixed costs (Gaulke, 2020). Current restrictions and capacity limits may prevent owners from breaking even unless other profitable designs are implemented.

Theme Parks

Even "the happiest place on Earth" is not immune from the impacts of the global pandemic. Popular attractions such as Walt Disney World have revisited business plans to address health and safety concerns. The reopening of its Polynesian Village Resort has been delayed until mid-2021. Two other hotels, the Beach Club Resort and BoardWalk Inn, closed in March 2020 and will remain closed indefinitely. The Orlando, Florida theme park is open, but operating with reduced hours as of November 2020. Decisions like these were made in light of the fact that Disney park attendance in Orlando is at 20% of normal operations, and hotel occupancy in Orlando trailed the

Figure 1—A Rendering of Burger King's Next Level Restaurant Design

Source: Burger King

national average by about 20% (Settembre, 2020).

Capacity Management

While the world waits for a COVID-19 vaccination and a return to pre-pandemic life, popular attractions, such as Walt Disney World, indicate some of their health and safety protocols and technology changes will remain in effect post-COVID. Both Disneyland and Walt Disney World have been implementing capacity management initiatives in recent years. For example, tickets that could once be purchased and used on any date are now a variable-based pricing model for the date of attendance. While it does seem that a business would want to maximize ticket sales to maximize revenue, exceeding capacity limits can adversely affect the bottom line. If the park is overcrowded, not only does the quality of the experience suffer for the customer, customer spending can decrease due to increased wait times for attractions and food. By using a reservation system, Disney is seeking to find the optimum point where more money can be made by restricting attendance, because the guests that are there spend more cash. How can a reservation system help even on days when Disney does not expect overcrowding at the parks? A reservation system can help the company improve efficiencies and labor productivity by scheduling an appropriate number of employees (or cast members as Disney refers to them). In addition to helping prevent a lack of enough cast members for the day, the system can help ensure the park does not schedule too many cast members (Spencer, 2020).

Disney is implementing other technologies that can assist with wait line management and guest experience such as mobile ordering (Libbey, 2020). Meals would be ready when customers arrive, thereby reducing lines and improving customer satisfaction. Payments without the use of cash or credit cards is another feature that addresses not only health and safety, but capacity management as well.

Conclusions

The COVID-19 pandemic has caused firms to conduct process analyses of their operations and redesign service systems. In addition to evaluating service design and capacity management as discussed in this paper, the impact of the pandemic forces operations managers to address other areas of the operations management field such as risk management planning, forecasting models, inventory management policies, logistics, and more. While this paper addressed operations management decisions in large franchise operations, decisions and outcomes could look quite different in small to medium-sized entities.

Continuous improvement is a central tenet of operations management. Operations management continuously focuses on processes and how to perform them more efficiently, while considering customer requirements. In a post-pandemic world, successful firms will continue to evaluate their systems and make changes and improvements. Whether from emerging technological innovations, shifts in customer preferences, or something as significant as a global health pandemic, successful firms will continue asking themselves what can be done differently and what can be done better.

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Inventory Management and ERP Integration

Shauna Clemons
B.S. Management Major and Logistics and Supply Chain Management Minor

ABSTRACT

Inventory management is an essential part of the movement of goods and services; as it becomes more crucial to the business aspect, there is more need for a better organization which is how enterprise resource planning (ERP) is involved. "Inventory management is a key component in logistics and supply chain management, in part because inventory decisions are often a starting point or driver for other business activities such as warehousing, transportation, and materials handling" (Knemeyer, 2018). Inventory management can be a very complex organization on its own, and the objective is specific to the organization's particular functions. As online shopping progresses and more organizations are forced to close physical stores, inventory management's importance has increased dramatically. As inventory management becomes more vital to an organization's overall end-of-year profit, the need for inventory management has substantially risen.

Introduction

Maintaining an organization's inventory levels is closely related to the demands of the particular product or service. Management of these levels and finding an appropriate balance between scheduling, inventory cost, production, and sales are not easy tasks. Many companies are turning to enterprise resource planning (ERP) to assist with data organization. ERP is application software that manages and integrates the day-to-day activities in a business. These activities include inventory, risk management, finance, human resources, marketing, and sales, among other components, to simplify and communicate its procedures. ERP systems' primary purpose is to optimize and manage an organization's resources and supply cross-organization integrated data, including internal, external, and connecting front office to back office operations. Other than its great integrating, organizing, and communication attributes, "these software packages can be customized to cater for the specific needs of an organization. All these modules are accessing shared resources (a database)" (El Masbahi et al., 2012).

Implementing ERP systems into an organization can be quite challenging, from integrating applications capable of linking an entire company's operations to being user-friendly to customizations. ERP implementation takes strategic thought, planning, and analysis before the decision to implement it can be made. Popular ERP systems organizations have implemented include SAP, Oracle, Sage, and J.D. Edwards. These are just a few that are well known and widely used among various agencies. As stated earlier, it takes much planning and strategizing before making the final decision. Part of this strategizing is deciding which departments will be implemented first and the costs associated with the implementation. "Purchase, inventory and sale processes are often implemented first in ERP and are then stabilized before integration of production and planning processes" (El Masbahi et al., 2012).

Risk and Reward

Inventory management is an essential part of an organization's overall financial stability and profitability. Since inventory management is a vital component of an organization's success, it is imperative to have an appropriate level of inventory. ERP implementation is an efficient way to manage inventory, carrying cost, stockouts, demand management, and communication throughout other departments in an organization to optimize results and profits. ERP software and implementation costs can vary depending on the company's size, leadership styles, functionality of the ERP system, and customizations required. These costs range from $100,000 to the mid-millions. "When compounded by the high cost of introducing ERP, which is often more than a typical enterprise can handle, ERP is infrequently implemented" (Liu & Fan, 2020). The cost of the actual software and implementation is just one factor; other factors are downtime, implementation timeline, and the organization's capacity to run while the implementation process is happening.

There are many risks involved with implementing an ERP system into an organization, particularly inventory management. The occurrence of unpredicted events often results in forecast errors (Ho & Ireland, 2012), and modern enterprises rely on enterprise resource planning (ERP) to substantially control, as well as handle, internal and external uncertainties—for example, safety stock, delivery deadlines, overtime, and contract work—to maintain their competitive advantage (Liu & Fan, 2020). The organization frequently makes the mistake of not gathering the right team to oversee the ERP implementation. This action requires a group with different knowledge and insight, who are all of one accord and understand the end goal. Corporate vision, management support, and dedicated priority of the ERP implementation are vital for its success. Another common mistake made is lacking the in-house IT personnel who have the capabilities and understanding to complete minor maintenance and troubleshooting. The risk of data not getting appropriately integrated is considerable, but with the correct planning and ERP supplier, those are minor issues to overcome.

The growth rate of companies with and without an integrated ERP system is quite vast. Inventory management is a very complex task due to the nature of the inventory. It is a peculiar industry that does not require accuracy, strategy, outstanding leadership, organization, and planning. With the advancements in technology, these attributes can be managed, as well as communicated through

an implemented system. "This advantage has enabled entrepreneurs, independent brands, and founders in a native commerce world to freely compete with small, medium, and global conglomerates" (Baron et al., 2010). "The advantage of technology shows that the inventory management platform is even, and businesses can grow their brands with scalability, speed, and smart insights" (Gills et al., 2020). These advantages result in a faster growth rate than companies without a successfully implemented ERP system. They are more likely to excel due to cost reduction, shorter delivery times, less spoilage, and through optimization of resources.

Because inventory is a crucial function of an organization's profitability, the correct management techniques are equally important. Inventory management's fundamental goal is to reduce stock-outs, achieve efficient inventory turnover, and gain more sales. Many companies without an integrated information system lack communication between departments and, as a result, typically hold inventory longer. This can incur greater stock holding costs compared to a company with an integrated ERP system that has readily available real-time shared data to combat those costs. "While excess inventory does increase costs, a shortage of inventory may result in lost sales. Prior research has focused on inventory management methods and optimal inventory sizes related to the balance between more technological information systems, inventory cost savings, and production/sales efficiency" (Shin et al., 2015).

Reductions in inventory, centralized data, quicker inventory turnover, simplified communication between departments and increase in cash flow are seen in companies who utilize an integrated ERP system. Increases in cash flow allow for businesses to purchase more inventory, increase payroll, and overall improve the business. This is particularly important when it comes to the organization's profitability and operation costs. ERP systems can calculate and store finances, sales, inventory costs, as well as an organization's operation costs, in one system; this is much more efficient than having a paper copy of all those files or outsourcing file management to another company. "Therefore, any business must realize that technology enhances the capability to manage inventory and choose to integrate them into the strategies, processes, and techniques they prefer. It is almost necessary to use it in this century" (Gills et al., 2020).

Benefits of Implementation

There are numerous benefits of implementing an ERP system into an organization, especially where inventory management is concerned. One of the significant benefits is improved customer service, which is one of the main reasons for a company's continued success. This is particularly important as e-commerce has grown tremendously over the last decade. As technology advances almost daily, so do customer demands and expectations for receipt of and prompt access to products. ERP systems allow quicker delivery times, fast inventory turnover, and accurate data to predict a product's demand.

Another beneficial factor of implementing an ERP system is an advantage in lead time. Lead time is the time between when an order is placed and the delivery of that order to a consumer. Lead time is essential in satisfying customers and is a great marketing tactic when an organization is known for efficiently fulfilling orders. This factor can be a great asset to a dropshipping company or an overseas vendor with an integrated system that can communicate efficiently. "JIT is a philosophy of management that reduces waste and improves quality in all business processes. JIT has been applied to many Japanese manufacturing firms since the 1970s" (Cheng & Podolsky, 1996). JIT originated from the Toyota production systems (TPS) and serves to reduce inventory and lead time while increasing quality of production (Shin et al., 2015).

Conclusion

Uncertainty in demand can be a breaking point for an organization that is not prepared or has no strategic plan in place to combat the uncertainty. Optimizing ERP's ability to communicate and share data internally and externally throughout an organization is beneficial in various ways. These benefits of communication positively impact buyer to seller, buyer to supplier, and supplier to consumer relationships. One study asserted that firms with high inventory ratios were most likely to be weak financial performers. Similarly, Fullerton et al. (2003) and Demeter (2003) revealed that high inventory turnover associated significantly with a higher return on sales.

Inventory management is a demanding and complex process that is composed of many components. As demand increases in today's society and convenience is a crucial factor, inventory management has an enormous impact on its success. The need for more efficiency, communication, and sharing of data both internally and externally, is also much more vital. Enterprise resource planning (ERP) implementation is a beneficial way of strategically managing all components in one system across the organization. Although, as with any other venture, some risks are included, ERP integration, when done correctly, can grow the overall operations of an organization. Growth in customer satisfaction, lead time, cash flow, and decreased inventory costs results from implementing ERP with strategic planning. As technology advances to a more intelligent world, ERP implementation is almost essential in the competitive advantage and overall growth of an organization.

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Digitization: Types and the Effects on Manual Logistics Processes

Alisha Z. Collier
M.Ed. Career and Technical Education Major

ABSTRACT

This paper describes the concept of digitization and its effects on the logistics process. A definition and description of the Internet of Things is provided to frame how business is already being done digitally. Then, a definition of digitization is given, as well as when it began and how it has evolved and continues to evolve over time. Three types of technology (RFID, artificial intelligence, and mobile applications) that are aiding in the digitization of some manual logistics processes are defined and described, and examples of their best uses are provided. Finally, a conclusion discusses how the three types of technology work together, how they are improving the logistics process, and what the increasing shift towards digitization means for human capital.

Introduction

"Digitization, in its simplest definition, is the process of collecting data from disparate silos or buckets and aggregating it to create a holistic view of individual processes from beginning to end" (Logmore, 2019). In practice, digitization as it relates to the process of logistics means using technology in innovative ways to replace some manual processes that can be error-prone and costly. Using technology has been shown to significantly reduce operating costs, improve "supply chain integration," and allow companies to become more competitive in their markets because of being better able to meet customer demand (Gilmore, 2020). The growing Internet of Things (IoT) method of consumerism is fueling the shift to digitization. Making the switch to digital logistics may translate to greater transparency, real-time visibility of order fulfillment, inventory status knowledge to ensure items are replenished faster and provide insight into consumer trends, more accurate shipment updates, and also increase customer satisfaction (Logmore, 2019).

Radio-Frequency Identification

"Radio Frequency Identification (RFID) is the method for reading physical tags on single products, cases, pallets, or reusable containers that omit radio signals to be picked up by reader devices. These tags and devices must be supported by a sophisticated software architecture that enables collection and distribution of location-based information in near real time" (Franz, 2008). RFID technology has proven beneficial to companies by giving them the supply chain information they need to keep inventory levels sufficient for consumers who want their items faster and are frequently using technology to order. "RFID was introduced to the world in the 1960s and became commercialized in the 1970s and 1980s by federal government agencies and the Department of Defense" (Franz, 2008).

One example of RFID, as it relates to logistics, is in the airline industry. A few years ago, Delta Airlines, the American commercial airline company, began putting RFID tags onto their luggage. By doing so, they "created not only a far more effective system to track baggage, but also introduced a passenger-facing feature via the Delta app, automatically notifying passengers when their baggage loads onto the aircraft, and when it arrives on the baggage carousel" (Hope, 2017). The use of RFID has resulted in a more efficient process for Delta as it no longer must staff multiple baggage officer staffers (reduced to one employee in most locations) and provides customers with a more transparent view of the location of their luggage at any given time. The implementation of RFID technology on luggage tags has not only proven efficient for the company and increased customer satisfaction, but it has also reduced costs in the form of insurance payouts to customers for lost luggage.

Another example of RFID being used to improve the logistical flow of a process is in hospitals. "Since mid-2000s, hospitals have begun implementing radio-frequency identification (RFID) technology in order to improve their operations" (Moatari-Kazerouni & Bendavid, 2017). In hospitals, RFID is used to improve the traceability of staff, patients, and even equipment. Specifically, the technology was studied to see how effective it is in tracing surgical instruments throughout their lifecycle of unpacking, being sterilized, used, re-sterilized, and put back into the rotation for use again. The flow of a piece of surgical equipment starts in the central sterilization department, flows to the operating room, back to the sterilization department, where the process starts over. By using RFID to trace tools, hospitals can better track the location of expensive surgical instruments and reduce the cost of replacing them (Moatari-Kazerouni & Bendavid, 2017).

According to a study published in 2018, "U.S. brand owners and retailers using Electronic Product Code (EP)-enabled radio frequency identification (RFID) to optimize inventory management and reconcile product shipments are capable of achieving 99.9 percent order accuracy" (Material Handling & Logistics, 2018). The study goes on to find that retailers that use RFID technology at the line-item level are able to realize many tangible and intangible benefits such as lower out-of-stock inventory, improved loss prevention, increased sales and faster returns (Material Handling & Logistics, 2018). From each example of RFID in use in place of the manual logistics process, the firms and industries using it have seen reduced costs and improved customer satisfaction, resulting in higher profits.

Artificial Intelligence

According to research published in Material Handling & Logistics (2018), "Artificial intelligence (AI) can help logistics providers deliver articles before the customer has even ordered them." The research cites information from shipment company, DHL, and software developer, IBM. Matthias Heutger, head of Global Innovation at DHL, views "proactive and predictive logistics operations" as more crucial than ever due to the Internet of Things and consumers' growing demand for greater speed of delivery and automated ordering (Material Handling & Logistics, 2018). Uses for artificial intelligence in logistics include using "advanced image recognition to track condition of shipments," bring greater transparency throughout the logistics transportation lifecycle, and serve as a forecaster for global

shipment inventory highs and lows (Material Handling & Logistics, 2018). Regarding AI replacing human labor, artificial intelligence that has the capability to perform work once done by humans may allow those workers to shift their skills toward tasks that add more value. Consequently, some of those positions may mean workers need to be highly skilled and could result in layoffs of unskilled workers unless firms invest in retraining.

Another example of artificial intelligence improving upon manual labor in the logistics process is in the research cited in the Manufacturing Engineering Journal where "two MiR100 robots from Mobile Industrial Robots have improved logistics and efficiency and are helping New Jersey-based manufacturer Magna-Power compete in a global market" (Anonymous, 2017). According to the research, the robots have taken over the work of three full-time human employees that were doing tasks with low value to the firm like transporting moving parts so that they can perform tasks that have a greater value to the company (Anonymous, 2017). The company, which is growing and made the strategic decision to move all their operations in-house, realized that a large portion of time spent by employees was moving components around the plant. After a cost analysis, the firm decided to invest in autonomous vehicles to transport these components. "The purpose of the robot is not to replace employees, but to make them more efficient with their time. Now they can focus on the things we cannot get a robot to do," says Grant Pitel, Magna-Power's Vice President of Engineering (Anonymous, 2017). In addition to allowing more employees to focus on high-dollar tasks, their return on investment took less than a year to be realized. Mobile robots may also improve workflow, allowing components to be delivered faster so employees do not have to wait for materials (Anonymous, 2017). This research may be a beneficial example of how artificial intelligence can be used alongside human employees so that the human capital does not need to be laid off.

Amazon, the online retailer who is rivaled only by Wal-Mart, has also implemented several artificial intelligence tools to improve logistics processes in its fulfillment centers. The robotic palletizer has been used to lift over "two billion pounds of totes across Amazon's hundreds of fulfillment centers" (TransMetrics, 2019). Human "flow control specialists" monitor the performance, activity, and traffic patterns of the robots to ensure that they are functioning properly. Amazon invested in human employees to control the robots that are now performing the low-level task of transporting which, in return, preserves jobs.

Mobile Applications

Software applications ("apps") serve various uses in our personal and professional lives. There are apps for calorie tracking, apps to track the number of steps taken in a day, apps to place orders with retailers of all kinds, and the list continues. Mobile software applications have become even more ubiquitous due to over "3.2 billion users across the world" downloading and using them (Buildfire, 2021). A recent study suggests that "88% of mobile time is spent on apps" (Buildfire, 2021). So it is no surprise that the use of mobile applications have been found useful outside our personal lives and are now being used to improve business processes like logistics.

In one example of mobile apps supporting logistics processes, a study examined a business model that used a software application to support local and urban electronic grocery delivery. The study sought to show how the use of such applications could "bridge infrastructural barriers, costs and complexities associated with e-grocery delivery operations in rural township areas" (Mkansi et al., 2019). The researchers studied eight national grocery delivery services that were using this technology in South Africa. The study revealed how "using mobile application innovation fuels value-added services that power new e-grocery distribution models" (Mkansi et al., 2019). The findings also showed how, through the use of the applications, the businesses were better able to gauge demand for products faster, respond to that demand quicker, and allowed businesses to use each other to thrive and serve more customers (Mkansi et al., 2019). Finally, the study aimed to show how more families can be fed in poorer regions of South Africa using e-grocery powered food distribution. Even the poorest communities in South Africa may have access to some sort of mobile device which may make receiving nutritious food more accessible to larger swaths of the population and decrease food-scarcity and malnutrition (Mkansi et al., 2019).

Military logistics bases also use mobile apps in the form of mobile scanners to "ensure the efficiency and security of logistics processes in relation to inventory management, building maintenance, and operation" (MENA Report, 2018). In this application, a Mobile Device Management (MDM) firm provides the mobile solutions necessary for the mobile scanners in the form of "handheld computers, smartphones, tablets, and forklift terminals" (MENA Report, 2018). The MDM also manages the mobile scanners house and transport. This military example is similar to outsourcing and searching for a supplier in civilian industries where the technology would come from an outside source. The strategy may be less costly, but may also prove to be a security risk if the MDM has international business interests.

Another military example of mobile applications being used in the logistics process is the use of mobile technology by Navy mobile computing teams to "deliver improved logistics readiness to the fleet" (Logan, 2019). Using this technology, the naval group can provide solutions to everyday transactions in real time. The naval mobile unit is comprised of the mobile device management team, as well as teams that support the individual sites. This multi-faceted team approach may help to alleviate some of the risk mentioned above with outsourcing suppliers to build the infrastructure. The Navy is also employing a standard set of devices that aid in the logistics process by "minimizing costs, while accurately and efficiently capturing logistics data at its source" (Logan, 2019).

Mobile apps are also being used to "help the transportation and logistics industry better assign costs based on responsibility for damaged shipping containers" (Material Handling & Logistics, 2017). The inspection process now uses a mobile application to "establish a verifiable photographic record for the equipment being interchanged between parties" (Material Handling & Logistics, 2017). Users of the system have their own accounts and are able to guide inspection personnel or truck drivers every step of the way and are able to document intact equipment, as well as damaged equipment, and separate it faster. The documentation is collected with the mobile application by pointing the mobile device's camera "at the truck, chassis, or container number, taking a picture" (Material Handling & Logistics, 2017). This action collects the necessary information. Damage is quickly flagged, identified and determined which parts can be repaired, or the equipment that can be pulled from use. This transparency leads to greater efficiency and reduces operational costs due to damaged equipment not being used or repaired faster. The use of the mobile app to collect and store information also makes it wide-

ly available to interested parties—suppliers, manufacturers, customers, and the individuals who may need to repair the equipment—who benefit from more timely information.

Conclusion

Each technology previously discussed has the ability to complement the others. RFID can be used alongside military use of mobile applications in the flagging of damaged equipment and increased transparency. Artificial intelligence such as robots, similar to those Amazon uses, can be used in hospitals to deliver medicines to patients considered too contagious for human contact or to transport used surgical equipment back to the sterilization department. In each scenario, none of the technology is taking the place of humans; humans are always at the helm. Whether they are monitoring the robots for deviations from their assigned routes at Amazon fulfillment centers, building the infrastructure and implementing the design and use of mobile apps in the military, or setting up e-grocery delivery channels for impoverished communities in South Africa, human capital is proving to be irreplaceable in many respects. Robots and other forms of technology are assuming low-level tasks which allow humans to take on the responsibilities of higher-level, complex tasks. These tasks may require additional training to learn new skills, but this is an inevitable part of any new way of doing business. "Digital logistics recognizes the growing convergence of logistics operation and technology strategy, and is also driven by a new generation of web-based, enterprise logistics applications that enable collaboration, optimization, leveraging a central logistics information backbone that provides visibility across the enterprise and extended supply chain" (Gilmore, 2020). These advancements were not available 30 years ago. As a result, the logistics process was prone to human error, resulting in financial losses due to unforeseen lapses in the supply chain and slower delivery time for consumers. Now most of these errors can be eliminated due to the transparency and speed that digitization provides.

The shift to technology has also allowed most of our work to be done remotely. Many companies had to make the shift during the pandemic to embrace technology like AI, RFID, and mobile apps to adapt to the abrupt marketplace shakeup. Restaurants embraced mobile delivery applications to stay afloat as they were forced to shut down indoor dining. Walmart introduced its membership service Walmart+ to rival Amazon's Prime service. This move may have come later had the pandemic not sped up the shift to online shopping. However, through all these changes, the human has not been removed from the equation. There are still distribution centers in need of sorters and packers; there are still delivery trucks in need of drivers to deliver packages; there are still restaurants in need of food preparers; and there are still services that can never be fully automated. Only some parts of the logistics process may be able to be automated; we cannot teach robots to do everything.

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Quality in Supply Management

Maweyah Deen
Global Logistics and Supply Chain Management Major

ABSTRACT

Quality is not achieved by accident. It is a product of great intention, intelligent direction, sincere effort, and is representative of the wisest choice. This supposition is true even in supply management, considering it deals with identifying, acquiring, and managing suppliers and resources essential to firm operations. Its necessity ranges from the purchase of literal goods, services, information, and all essential resources that facilitate firm operation and growth. Without quality in this sector, the organization's functionalities and production become hindered, as either the resources are not in parity with the requirements or are not timely. However, with adequacy in this sector, a firm can decrease fixed assets by mitigating the acquisition and employment of assets in storage, transportation, and production; thus diminishing costs. Consequently, it increases the speed of product flow to consumers. Therefore, quality in supply management is critical to firm productivity and survival; hence, this paper explores the aspect of defining quality in supply management and ascertaining sustainable ways to employ quality in any supply chain.

Introduction

Different studies define quality in supply management in distinctive ways, but the general standard argues it as providing supply services that meet or exceed the consumers' expectations. According to Quant et al. (2016, p. 446), quality in supply is about the orientation, coordination, and implementation of firm functions in the supply chain to run smoothly. Its primary aim is to improve operational and product quality, thus increasing customer satisfaction. The article further argues that such quality can be achieved accurately by meeting market demands and enhancing operational and financial performance. Consequently, the supply chain shall have quality processes and activities, increasing consumer trust in the product or service. Another study argues that traditional quality management practices can be employed in the supply chain, considering the competition in the contemporary business world is no longer business-related, but rather supply chain-related (Fish, 2011). With this supposition in mind, the article defines supply chain quality management as a system-based approach to performance improvement by integrating all supply chain partners while also leveraging opportunities both upwards and downwards in the supply chain. All these measures are aimed at value creation and satisfaction for both the final and intermediate consumers. Simchi-Levi et al. (2008) defined quality supply management as an approach that integrates suppliers, distributors, retailers, and manufacturers, thus ensuring that merchandise is produced and distributed in the right quality, location, logistics, quantity, and time. The mutual goal here is minimizing company-wide costs while satisfying consumer service requirements. After comparing several definitions, it is right to surmise that quality in the supply chain focuses on how the management of suppliers and their associations with the firm can be improved and smoothened to ensure consumer expectations are met or surpassed.

Additionally, quality in supply management gets achieved through the assurance of supplier quality, necessitating its definition. A supplier quality report defined it as a supplier's ability to deliver services or goods that meet the consumers' expectations. Thus, supplier quality management is defined as a system of managing suppliers' quality by using proactive and collaborative approaches (Doshi, 2018, p. 1). The paper argues that an organization must ensure its service or material suppliers provide impeccable products or services in conformity with any pre-established requirements. The suggested means of achieving such quality is through quality management systems (QMS) that allow companies to monitor supply chains continually, thus inspecting and auditing them regularly. Furthermore, supply quality management should begin as early as product design and supplier selection. It should also go beyond getting a low price or acquiring the best deal on materials. Instead, it should focus on transaction costs, delivery reliability, finding solutions, suppliers' internal policy, and supplier change. Such quality supplier management processes are critical to quality supply management, hence its inclusion in the definition.

The Benefits and Importance of Quality in Supply Management

Quality is paramount in the relationship between suppliers and consumers. To begin, quality management enhancements that inhibit process variation have a direct impact on supply chain measures. They ascertain consistency in the supply chain, thus reducing cycle times and ensuring timely delivery. According to Madar (2020, p. 42), the implementation of quality management systems aims to improve company performance through the design, production, and delivery of goods of the highest quality. It eliminates any barriers in the organization's processes, ensuring no organization culture deviates from the processes' target. As a result, all functions occur as designed and with impeccable quality. Alternatively, it allows the organization to timely edit its directives based on consumer requirements. With clear and targeted quality directives, it is easier to customize products as per consumer requirements. A study on the moderating effects of supply chain dynamic capabilities found that, with quality supply management, it is possible to have a sustainable supply chain that is integrated and can evolve to enhance business performance (Sessu et al., 2020). In their analysis of the restaurant industry in Indonesia, the researchers found that quality supply management is critical to how the restaurants can meet the different trends in the market. With a well-established supply chain, it is easier to modify suppliers and resources to meet the clientele changes, however abrupt or unique. Therefore, in consumer satisfaction, the studies by Madar (2020) and Sessu et al. (2020) confirm quality supply management can ensure not only customer satisfaction, but also the meeting of market changes per consumer trends.

Quality supply ensures organizations meet the changing envi-

ronments of businesses. Melnyk et al. (2019) surmised that the changes in technologies such as the internet, Big Data, RFIDs, and 3D printing have enhanced how business occurs in terms of responsiveness, sustainability, and innovation. The article emphasizes that these changes have morphed the supply chain into one that is quality-driven rather than price-driven. Therefore, the paper recommends a form of supply management that questions the consumers' needs and what the organization promised in its execution of firm activities. Alternatively, it must identify the shared vision between the involved parties and devise a strategy that prioritizes courses of action toward that vision (Melnyk et al., 2020). A causal survey among six organizations in the Brazilian healthcare industry reaffirms the notions by its counterpart. In its findings, the six managers interviewed confirmed that patient-care responsiveness gets assured by the formalized and in-formalized relationships in the supply chain of the sector. While management's awareness is limited, the implemented mechanisms in the supply chain increase the quality of the resources. As such, the deployment of both formal and informal quality assurance mechanisms in the supply chain elevate an organization's ability to meet its client's needs. These relationships, formal and informal, were credited with assisting the hospitals' clientele in accessing new drugs and therapeutic services with ease compared to institutions that lacked such relationships. Furthermore, institutions with such connections could meet medical technological changes immediately upon entrance into the market (Martins et al., 2020). From these studies, it is right to surmise that quality in supply management helps organizations achieve customer satisfaction regardless of the changes in business environments.

While quality in supply management has outstanding outcomes for the consumers, it also plays a significant role in an organization's functionality. First, it helps the leadership manage the business's supply by ensuring it is aligned, well-rounded, and that the set goals monitor and evaluate performance well. A study on the relationship between quality and governance mechanisms in healthcare organizations found that the application of quality measures in the sector's supply chain facilitates impeccable governance, both formal and informal (Martins et al., 2020). The evaluation that included both local and international healthcare service and product providers ascertained that, by implementing quality aspects such as accreditation and other quality seals, the organizations managed to bridge several goals through quality assurance. The quality relationships, formal and informal, within the supply chain instilled confidence and commitment bonds that came in handy in governance. The contracts employed to facilitate quality supply and guarantee product delivery, thus instigated quality in the supply while also smoothening the management's role. The standard operating procedures (SOPs) guarantee uniformity in executing supply activities with or without management's involvement. Finally, with clear set directives on quality in the supply chain, there is satisfaction among all stakeholders, thus smoothening all operations (Martins et al., 2020). All these aspects of quality enhance the management of the business as activities have clear and targeted directives mitigating the need for management to direct all activities; instead, they merely chaperone.

Quality in supply management has also been credited with the promotion of company culture. According to Ord (2018), quality in supply management defines the role and goal of all the stakeholders in the organization as meeting the consumer's needs. Therefore, all set processes, policies, and procedures that constitute operational planning and decision making follow these directives. Another study found that quality supply management improves the bottom line, since it encourages employees and suppliers to systematically address involved risks and opportunities. Such strategies improve organizational efficiency and productivity, resulting in an improved bottom line, and facilitate the management of new inventions. Through quality supply management, organizations can continuously update and diversify their products and services, thus establishing an organization as a leader in innovation in the respective sector. Diversification and innovation broaden a firm's market while also accelerating growth. The study, focusing on Starbucks, finally suggests that quality supply management improves a company's troubleshooting and strategically changes culture by identifying the non-performing sectors (Madar, 2020). From these reports, the researchers all agree that strategic quality management in the supply sector enhances all parts of a company's culture from supply and production to marketing.

Steps to Improve Quality in Supply Management

The implementation of total quality management in supply was identified to have seven critical stages. The stages define and implement quality based on different aspects that elevate consumer satisfaction. They make quality the responsibility of everyone by focusing on the process rather than the outcome. They establish control of quality from the source and stress objective rather than subjective analysis. Additionally, they emphasize the prevention of defects rather than their detection and solution, hence striving for zero defects. By ranging within the mentioned aspects, the steps establish quality supply management as a continuous improvement of the consumer's way of life. The process involves all the total quality management factors of leadership, strategic planning, supplier quality management, human resource management, customer focus, and process management. The seven steps of comprehensive quality management systems implementation are discussed next.

In the first step, the organization establishes a commitment to change by organizing the appropriate management teams and leadership. In this stage, it is the responsibility of the top management to provide support, dedication, and commitment to the achievement of this quality. As such, the leadership involved must show enough competency to meet the requirements (Fish, 2011). The study further argues that competent leadership is essential as it directs the involved processes, helps overcome firm culture barriers, and facilitates human resource management. The result is a well-directed process of supply chain linkage building, collaboration, communication integration within the supply chain, and the general improvement of firm performance and quality. With such elaborate teams and leaders to focus them, the organization is ready to begin the actual process of establishing quality supply management.

The next step involves the development of the supply management vision and mission of the organization in question. In this stage, the new strategies get defined, with each stakeholder getting assigned their roles and responsibilities. Fish (2011) reported that this step involves developing both long-term and short-term goals and strategies. The goals and strategies must envision the top-management's supply chain linkages that positively impact the quality of service or product. Additionally, it should bridge the gaps between the various organizational departments and stakeholders by

meeting the expected operation quality. In the contemporary supply chain, such efforts focus on evaluating suppliers and their supply-based rationalization to ensure they are aligned with the organization's and its consumer's requirements. Ultimately, the supply chain stakeholders must jointly strategize to create missions, goals, and tactics that elevate their shared values and operations. This cooperation should include the development of trust by encouraging reliability in the supply chain (Madar, 2020).

The next critical step is the decomposition of the mission and goals into essential factors of success. The firm establishes significant factors in its supply chain operation based on the collected and analyzed data (Madar, 2020). If the firm is involved in the service industry, human resources must be well recruited and trained to meet customer needs. In the production sector, the focus is on the quality of products based on consumer value. Additionally, the timely aspect can be approached based on how fast the consumers require the product or service. Ultimately, all these aspects shall be founded on the identified critical success factors. The fourth step involves the definition of key performance indicators of the sector in question. Like its predecessor, its execution is dependent on the collected, processed, and analyzed data. The right approach to achieving this step is to first evaluate the existent key performance indicators (KPIs) to know which to drop and which to retain. The next step is to estimate the set goals to know their measurability. Next, set the actual KPIs by developing a list of actions, concepts, and milestones while involving all the firm stakeholders.

In the fifth step, identifying the firm's basic processes occurs as the stakeholders institutionalize its mission post-change. This step involves the development of a clear cooperative culture between the suppliers and buyers. Teamwork and communication efficacy training occur in this stage as the stakeholders prepare to implement the missions. This step's primary function is preparing the organization for the sixth step, which decomposes these missions into small applicable functions (Madar, 2020). In the sixth step, the organization begins establishing the approved changes in the supply chain. The effective people skills explored in the previous step come in handy here as relationships and partnerships within the supply chain get managed. Finally, the organization can integrate employees and processes through objective transformation. In this seventh step, the mission's accomplishments are evaluated and understood as they become applied (Madar, 2020). Suggested measures in this step are reducing supply bases, establishing closer relations with suppliers, launching joint strategic projects, inter-firm production scheduling, and finally developing a good quality culture. Additional measures include incorporating customized manufacturing designs, concurrent engineering, quality function deployment, and value engineering products (Fish, 2011). The final three stages in the process are involved with the deployment of the mission and establishment of actions as devised.

Quality Maintenance

The maintenance of quality in supply management gets facilitated by the performance metrics employed. According to Melnyk et al. (2020), there are three levels of performance: revenue generation, cost avoidance, and cost savings. When adequately employed, the levels can measure the cost, efficiency, sustainability, responsiveness, security, innovation, and resilience of the employed strategy. However, the suggested mode of measurement is cost savings, since it is straightforward and gets supported by most performance measures. These performance measures must also focus on statistics from big data and social media, considering their symbiotic relationship with the supply chain.

Such constant evaluation establishes measures that form the basis of quality maintenance in quality supply management. However, Melnyk et al. (2020) suggest eight directives that ensure performance measures are characteristic of the company's requirements. The first directive means using the performance measures to communicate the consumer's voice and the company's value proposition. Therefore, in quality maintenance, the focus should be on how the standards can be employed to instigate the firm's further growth to mirror consumer needs and company goals. As previously mentioned, the aim is to have supply quality that is sustainable, responsive, secure, resilient, and innovative as per the company and consumer needs. The security of the supply chain must be assured. The inclusion of technology in the supply chain must also be assured. The inclusion of technology in the supply chain through software and apps has opened up the sector to breaches. Protecting the firm's supply against such insecurities is an excellent way of maintaining quality supply management. The suppliers and the supply chain are a critical part of consumption and production, making any deviation in their competency bad for business.

It is also essential to know how many quality measures can be employed at a given time, considering they are expected to get more complex with time. The standard measures of quality that can be evaluated at a go are three. Otherwise, management can fail to employ quality measures competently. It is also essential to understand the measures are symptoms and not root causes. As such, the administration should strive to understand the root causes to better perform quality measurement. It is also essential to consider the measures as proxies of actual behavior to mitigate their outcomes being undesirable despite satisfying the measurement criteria. Finally, quality maintenance should be on predictive measures and steps that form a significant part of supply management (Melnyk et al, 2020). These criteria and directives are enough to maintain the quality of the supply management process.

Conclusion

Quality in supply management is critical to firm productivity and survival, considering its relevance to the relationship between suppliers and consumers. Without quality in this sector, the organization's functionalities and production become hindered, as either the resources are not in parity with the requirements or are not timely. However, with adequacy in this sector, a firm can decrease fixed assets by mitigating the acquisition and employment of assets in storage, transportation, and production, thus diminishing costs. Consequently, it increases the speed of product flow to consumers. The discussion explores measures relevant to quality in supply and how much quality can be maintained. In conclusion, the paper affirms the relevance of quality in the supply chain and its alternate consequences to firm performance.

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ERP Systems and Ways They Are Being Used in Today's Complex Business Environment to Integrate Customer Order Information

Victoria Moore
B.S. Management Major with a Minor in Logistics and Supply Chain Management

ABSTRACT

Contemporary business organizations face various challenges and fierce competition. This has led to an increased need for organizations to adopt technological systems to accurately manage information and business operations to gain a competitive advantage. Enterprise resource planning (ERP) is one such technology. ERP systems help organizations integrate various business processes for improved efficiency. This paper discusses ERP systems and how they are used to integrate customer order information. It will also examine the benefits of using ERP systems for a wide range of business functions.

ERP Systems

Following the dynamism of the contemporary business environment, organizations face various challenges and fierce competition. This has led to an increased need for organizations to adopt technological systems to accurately manage information and business operations to gain a competitive advantage. According to AlMuhayfith and Shaiti (2020), the contemporary marketplace's universal nature requires companies to automate their processes. A majority of organizations have adopted IT-related strategies and systems designed to make their operations more efficient. According to Yusuf et al. (2004), there is a wide range of benefits of adopting technological systems in business organizations. Such benefits entail quality improvement, cost reduction, productivity enhancement, and flexibility. A critical technological advancement in the business world is using the Enterprise Resource Planning (ERP) system that can be applied in a wide range of business functions, including the integration of consumer order information.

Description of ERP Systems

ERP is a technology that helps organizations to integrate various business processes for improved efficiency. According to Muketha and Micheni (2019), enterprise resource planning systems denote computerized systems that incorporate all the information and procedures of an organization into a centralized hub to facilitate business management efficiency. The systems help people from various departments update relevant information or gain access to the same data simultaneously without delay (Leon, 2011). This capability makes ERP systems key to promoting customer satisfaction by ensuring an organization-wide knowledge of consumer expectations. This paper focuses, specifically, on how ERP systems are used to integrate customer order information.

ERP systems provide business organizations with the capabilities to integrate multiple functional areas by providing transaction processing capabilities to integrate an organization's information systems. Typically, the ERP systems employ a relational database that, together with appropriate process design, allows the firm to capture data and automatically make it available for use throughout the organization by all authorized users (Sialitskaya & Panshin, 2010). Generally, ERP uses a centralized database for a wide variety of business processes. The system displays real-time data collected from various departments. For instance, the sales department may receive a customer order and transmit the information automatically to the distribution team that is most strategically positioned to fulfill the order on time. By making it possible to look up the inventory levels and shipment times, among other relevant factors, the ERP can help select the most cost-effective and productive distributor to complete the order.

ERP Order Management Systems

Every time a customer places an order, there is a process that runs in the background until the customer order is fulfilled. A series of operations occur at this phase of supply chain management, including accepting an order, picking, packing, shipping, and tracking the merchandise to ascertain that they reach the customer within the appointed timeframe. ERP systems are used to integrate all the activities involved in the order management cycle, thereby promoting efficiency (Ociepa-Kubicka, 2017). A critical component of the ERP that aids in managing consumer orders and related information is the order management system. ERP order management systems are used to enable fast and efficient order processing and timely and accurate order fulfillment.

Integration of Customer Order Information

Customer knowledge is one of the critical components of an organization's overall knowledge management. However, organizations face major challenges in addressing customer data without exploiting their knowledge. Due to the dynamism of consumer tastes and preferences, organizations strive to improve their consumer knowledge to improve customer satisfaction. According to Rollins (2008), a company's ability to manage customer information is key to sustainable competitiveness in any industry. Effective collection, processing, and communication of customer order information is a key aspect of maximization of customer satisfaction and organizational competitiveness.

Customer order denotes a transaction that represents a commitment on the customer's part to purchase one or more items from a company. Integration of customer order information helps an organization effectively process the order through the entire order fulfillment cycle (See Figure 1).

When a customer places an order with the sales department, the first step in order processing is to generate the order and submit it to the relevant departments. Order information is processed through an ERP order management solution where order entry is created. Upon entering the order in the system, every department in the organization is alerted in real time to ensure that all relevant stakeholders collaborate effectively to allow timely order processing.

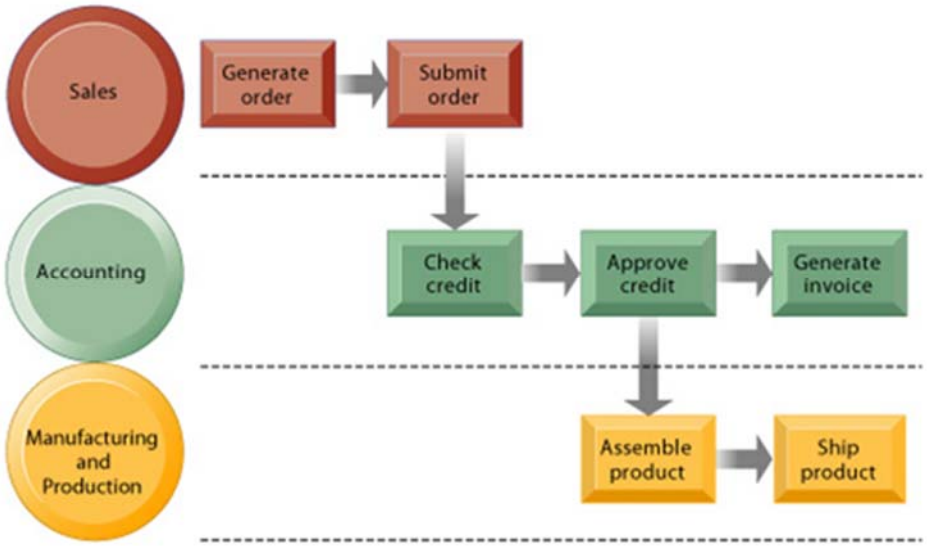

Figure 1—Order Fulfillment Process

Depending on the type of order, the store's department confirms the availability of the ordered items. By integrating the sales and stores department, the ERP system helps promote the speed at which customer orders are confirmed (Sialitskaya & Panshin, 2010). This is because the information entered in the customer request is reflected in the store in real time. The customer order information is then transmitted to the accounting department that reviews the payment details. Depending on the company's terms of payment, the company processes the customer's payment details (Sialitskaya & Panshin, 2010). For example, if the payment is to be met in credit terms, the accounting department checks the client's creditworthiness and approves or disapproves it depending on the company policy. If the order is approved, an invoice is generated and forwarded to the production department.

The manufacturing department assembles the product and forwards it to the distribution department for shipping to the customer. The customer order information is relevant to the production department, since the items taken out of store should be replaced to prevent shortage or stock out of inventory (Sialitskaya & Panshin, 2010). The production department also relies on the information to plan the production schedule to ensure that demand matches supply. The distribution department determines the most appropriate distribution channel and tracks the order while in transit to ensure the customer's timely order fulfillment. The customer order data is also displayed to the marketing department, whose primary responsibility is to develop relevant marketing strategies. The information helps the company devise appropriate promotional, segmentation, targeting, and positioning strategies.

Benefits of Integrating Customer Order Information

As businesses grow, consumer data becomes massive, creating a challenge to the organization. However, ERP systems can leverage big data to gain unprecedented insight into customer satisfaction. The insight allows for more accurate forecasting and improved scheduling. ERP systems analyze customer order information more accurately, minimizing the guesswork involved in predicting future demand for a product. An ERP system also analyzes more data in less time, allowing a company to simultaneously process numerous consumer orders (Ociepa-Kubicka, 2017). By integrating customer order information, an organization can identify operational inefficiencies more precisely, signaling the need to reallocate resources to areas that need them, thereby improving a firm scheduling efficiency.

Conclusion

In the contemporary business world, businesses rely on consumer data to effectively respond to consumer demand. Advancement in technology has made this endeavor inherently efficient. ERP systems help organizations to integrate various organizational functions, thus promoting efficiency. A major benefit of an ERP system is that it helps integrate consumer order information that aids in boosting customer satisfaction. When a customer places an order with the sales department, the order entry is transmitted to all departments of the organization. The accounting department uses the information to process payment; the manufacturing department uses it to schedule production. The distribution department uses the data to determine the appropriate delivery channel and to make delivery of the products to the customer. A major benefit of using an ERP system is to transmit the customer order information to all departments in real-time, thereby avoiding unnecessary delays within the supply chain. Integrating customer order information also helps organizations make strategic decisions such as forecasting and scheduling that are key to organizational success in the long term.

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Design for Logistics

Mikel Kabala
M.S. Global Logistics and Supply Chain Management Major

ABSTRACT

Trends in economic and political systems continue to show the importance of having logistics in management. Studies have shown that logistics design increases volume in the business field and continues to focus on designing logistics networks as more computer modeling is involved. Business organizations worldwide are constantly looking for new ways to minimize transportation costs without harming a product's performance. With all the trends taking place in the business environment, individuals and business organizations are working on effective ways to manage resources acquired, from their storage to final destination. With the help of logistics, businesses can simultaneously control costs and increase customer services. Logistical requirements help organizations be competitive, both by maintaining the products' bulkiness and expanding the customer services.

Introduction

Design for Logistics (DFL) is a common term in the business environment and is widely applicable in several departments. Design for logistics can be defined as the process of designing products for packaging, warehousing, repackaging for returns, merchandising, manufacturing, and shipping. Businesses are for more than making profits; they must also concentrate on what can be done to make a process or customer experience better and more reliable. The significant goals of packaging are to address environmental impact, marketing, security, and cost-efficiency. It is inevitable that individuals and businesses design their products from a logistics perspective to increase their competitive advantage. From the above assessment, it can be ascertained that DFL is an effective strategy that businesses rely on to design the products that reduce logistics costs. Therefore, this paper aims to elaborate on design for logistics and how it is applied in the business environment (Gardas et al., 2019). The research will also cover some essential topics related to merchandising, economical packaging, logistics methods, and cost impacted by the design decision.

Merchandising

In simple terms, merchandising involves all the processes included in the sale of a product to the retail customer. In other words, merchandising is everything that is incorporated into this process to ensure that once a potential customer has been identified, a sale will eventually be made (Harris, 2020). Business organizations hire merchandisers to optimize their profits and sales by ensuring that all the available online and retail stores are fully stocked with the right products, right quantities, and at the right time. There are seven standard Rs in merchandising. They are: right to the product, right to quantity, right to place/source, right condition, right time, right place, and the right customer (Pan et al., 2019). For example, when the right customer has been identified, then the right product must be present in the right quantities bearing the right price at the right place. If all the other aspects are present, but the right customer is not available, then the merchandising process is not practical.

Product Design

Product design is another essential process that is trending in the business environment. Product design is the process used to blend the final consumer and business goals' needs by consistently making successful products. The main work of product designers is to optimize users' experiences and create sustainable products that meet the consumers' long-term needs. There are three different types of product design: process design, system design, and interface design. With all the stiff competition in the business environment, it is beneficial for businesses to come up with effective product design to help boost their competitiveness.

The overall appearance of a product is vital when it comes to increasing sales of the product. The world is full of designs, and customers are often impressed by what they see even before buying it. Therefore, it is inevitable that design helps to increase sales and value of products. When a business organization has decided to increase the time designing a product, it means that the product's value should also increase. Consumers are usually willing to pay more for well-designed products (Pan et al., 2019). In general, well-designed products have improved functionality and usability. It is reasonable to conclude that product design plays an essential role in increasing an organization's sales and profits. Therefore, to gain a competitive advantage, businesses should be ready to invest more in product design.

Product design also helps minimize consumer complaints and increase their level of satisfaction. The better the invention, the more its value and attraction for the potential consumer. Product design also helps in building a stronger identity for the business and creates an easier path for new products to enter into the market. For instance, when a well-designed product is presented in the market for the first time, it attracts the potential consumers' attention and requires little to no explanation or promotion. So for business organizations to have an advantage when introducing new developments in the market, they should concentrate much of their time on designing the product (Pan et al., 2019). Additionally, product design helps to improve customer loyalty. When customers consistently find satisfaction from certain products, the chances are higher that they will be comfortable using the product. Overall, design products help consumers find satisfaction and businesses increase their profits and sales.

Economic Packaging

Economic packaging has a direct connection with design products and transportation. In other words, good product design can help in facilitating the easy shipment and storage of prod-

ucts. It is important for businesses and companies to manufacture products that are easy to track and pack. Economical packaging is beneficial when dealing with the overall reduction of logistics costs (Pan et al., 2019). In today's world, the market is becoming more competitive and demanding, making business organizations improve their packaging game. Today, consumers expect more in terms of enhanced services, competitive prices, variety of products, quality, and quantity. In context, logistics has become an essential strategic function to help companies have a competitive advantage over their competitors. Therefore, proper selection of the best packaging systems and packaging materials have helped manage logistics in the organization and maximize related benefits. To increase packaging and logistics benefits, organizations need to effectively manage proper selection and logistics for appropriate packaging. Packaging can be divided into three categories: materials, type, and a combination of both.

To better understand how packaging works, it is important to visualize the benefits and functions of this service in a business organization. Packaging is crucial as it offers protection to the products during movement and transportation (Gardas et al., 2019). With proper packaging, there is an assurance that the products are protected from transit damage. For instance, shipping is a common process in the world of international business. No matter the economic structure, there is always a need for products from other countries. Today, most of the raw materials used in developed countries come from developing countries. In return, the developing countries can get finished products. To ensure that both the raw materials and final products are protected from transit damage, proper packaging must be present. Also, packaging reduces cases of theft, loss, and spoilage during shipping and transportation processes (Nadari et al., 2020).

Packaging has a direct effect on sales and marketing. As mentioned earlier, consumers are influenced by the quality, quantity, and price of a product. Therefore, during the packaging process, organizations must consider the essential aspects that consumers rely on in the general market. In most cases, consumers buy products by looking at the product's appearance.

The last function of packaging is a combination of logistics and marketing. Logistics means everything when it comes to improving the sales and profits for most business organizations around the world. The packaging's overall functions can be divided into six categories: convenience, commitment, communication, protection, containment, and apportionment. All six parameters are used to analyze the role of packaging in logistics.

Economic packaging facilitates the easy shipment of products and appropriate ways to shelve them. With the increase in demand, manufacturing organizations should constantly be alert to consumers' needs. Some products should be in the market; others stored in warehouses; while others should be in the production process. To ensure that the cycle continues, organizations should have effective ways of packaging.

Logistics Methods

Several logistics methods are used to arrive at the benefits of logistics in an organization. To understand how logistics methods work, it is essential to examine the relationship between transportation and logistics. Transportation and logistics deal with management methods and other analytical techniques in logistics, transport, planning, and inventory (Harris, 2020). It is also the process involved in managing storage and transport activities in an organization that consists of financial flow information to meet consumers' requirements and expectations. Some of the standard methods are inventory management, contingency approach, outsourcing, and network analysis methods.

Logistics methods are fundamental in any organization as they make it easier for the products to be more available to potential customers. Also, logistics help improve a business's value by improving the merchandising process and increasing the availability of the products in the market (Harris, 2020). Finally, logistics methods help increase the usability of the products and their demand in the market.

Truck vs. Rail

All forms of transportation are essential for the movement of products from the manufacturer to the final destination or the consumer. The general cycle of products can be divided into three categories: production, transportation, and consumption. It is inevitable that transportation is the link between production and consumption, as it enables the movement of goods from the manufacturing companies to where potential customers can access them.

The use of railways/rail and roads/trucks are one of the most effective and reliable forms of transportation in the world today. Railways and roads have been in use since the invention period, and mostly during the colonization period when the colonizers were transporting raw materials from colonies to their manufacturing industries back home. Both methods of transportation are essential, but both have their advantages and disadvantages.

Truck or road transport is one of the frequent modes of transportation used worldwide. No country in the world does not have roads. One of the main advantages to road transportation, compared to rail transport, is that it offers door-to-door delivery (Naderi, 2020). Roads can pass through places where railways cannot reach or would be too costly to build. This allows for faster transport into more isolated areas. An advantage of using railways for transport is that, compared to trucks, rails can carry larger, more bulky goods. Rail transports are efficient because they are not affected by jams and congestions in towns. Also, in terms of fuel efficiency, trains are far better than trucks. Trains are inevitably safer than trucks as they have minimal accidents and are harder to be hijacked. However, an accident involving a train can be much more costly and deadly. Neither option is always better than the other, since each is used following the urgency and convenience of the methods and safety demanded (Naderi, 2020). It can be concluded that both trains and trucks are essential when it comes to transportation, depending on the final products being delivered and access to the potential consumers.

Air vs. Ocean

As in the case of truck vs. train, air and ocean transport are both important. Their primary purpose is to ensure that whatever needs to be transported reaches its destination. Air transport is undoubtedly faster than ocean transport. It can get to its destination in two or fewer days. In contrast, it can take days or weeks for an ocean vessel to reach its destination. On the other hand, ships can carry far more cargo than an airplane. Also, sea freight is usually cheaper compared to air, meaning more people can afford it. In most cases, sea freight is considered the national model of transportation when

a country's government is more concerned with what comes and goes out of its borders (Naderi et al., 2020). Despite their differences, it can be ascertained that both sea and ocean freight are essential in business. They arrive at the same purpose of offering vital transport options to individuals and companies.

Cost Impacted by Design Decision

Design decisions take into account different human considerations as a result of ergonomics to capabilities. Design decision brings out the elegance of execution into a product. In a world full of competing businesses, the design decision is an essential aspect of marketing and packaging (Pan et al., 2019). The physical display of a package plays a vital role in improving logistics benefits in a business. Critical design decisions also help in optimizing a product's usability and functionality. When it comes to cost of decision design, it is explained in two categories: the cost of making the change and the impact on the organization's manufacturing process. The cost impacted by design can be useful in terms of volume discount, shipping method, and complexity.

Shipping Method

The shipping method is the type of service that a shopper gets at the checkout. The shipping costs are added to the total cost of products and any other applicable/additional taxes (Gardas et al., 2019). There is a comprehensive outlet of shipping methods where people can choose from the most effective shipping methods or the fastest shipping methods, based on their needs and urgency. It is inevitable that the product's design influences the customer's shipping method.

Volume Discount

In business, volume discount can be defined as an economic incentive used to persuade businesses and individuals to purchase products in large and multiple quantities. In most cases, businesses and individuals are influenced by manufacturers offering rewards to those purchasing goods in bulk resulting in a reduction of the product price (Naderi et al., 2020). The design decision helps a business make the final decision regarding whether or not a volume discount is feasible.

Complexity

In the business world, complexity does not necessarily mean complicated. Instead, it emphasizes inter-dependencies and inter-connectedness where one change can directly impact other elements (Asmussen et al., 2018). Manufacturers make sure they identify everything that can be done to improve on the quality of products and meet the consumers' needs. Complexity also helps at improving the efficiencies of activities involved in the business environment. To succeed, business organizations should be willing to take advantage of any element available with the aim of meeting the consumers' expectations (Asmussen et al., 2018). Therefore, design decision plays an important role when it comes to dealing with complexity in logistics.

Conclusion

From the research provided, it can be concluded that logistics design is advantageous in the business world. It ensures that all concepts of chain management control logistics costs and increase customer services. Also, packaging is essential in a business environment when it comes to deciding on best ways to store and transport goods. Logistics design helps business organizations make the right choices about packaging that meets the customers' expectations. Businesses are about more than selling products and making profits; they must also build a strong relationship with the consumer buying their products.

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Inventory Management with ERP Systems

Colleen Horstman
B.S. Logistics and Supply Chain Management Major

ABSTRACT

Inventory management is a major, yet necessary, cost to doing business. Obvious costs include maintaining buildings, procuring materials, securing labor, and providing transportation of goods and services. Implementation of an Enterprise Resource Planning (ERP) system can provide significant cost, time, and resource savings. There are several options for ERP systems, and choosing the correct system for the business is an important decision. Having a plan and a project team dedicated to the system's implementation is critical in the system's success. This paper examines the risks and advantages of implementing an ERP system for inventory management and outlines the various areas where the system can be of benefit to a company's bottom line.

Introduction

Inventory management is a major, yet necessary, cost to doing business. The obvious costs associated with inventory management include buildings, procurement, labor, and transportation. Warehouses must be bought or rented to hold products, products purchased to be used as inventory, human capital to maintain the building and run the warehouse, and transportation services provided in-house or solicited from a third party to move the products to and from the warehouse. The less pronounced costs come in the form of shortages and excess stock. When there is not enough stock for demand, not only are those potential sales lost, but those customer relations could also be damaged or lost. The unnecessary carrying costs associated with excess stock are financially damaging. Implementing an enterprise resource planning (ERP) system in inventory management can address and solve these inefficiencies that are more prevalent in a manual system.

Benefits of an ERP System

An ERP system has many potential benefits in an organization. The benefits of ERP implementation in inventory management are significant cost, time, and resource savings. The capabilities of the system, with its knowledge of the materials and resources, offer a reduction in unnecessary inventory holdings as well as improved customer service and shortened administrative tasks (Anonymous, 2008). Since the system has a running tally of inventory numbers, reports are much easier and quicker for administrators to generate compared to a manually tracked inventory system. In a demand driven inventory, the signaling process known as Kanban is used in ERP systems as a trigger to signal all areas using ERP that consumption has occurred (Davis, 2013). For inventory management, this trigger will start a movement in the warehouse to send out a product to replenish what was consumed and request more in its place. As for forecasting demand, ERP systems supply the information needed to calculate an accurate forecasting model that can then be used to maintain the most efficient safety stock levels. A study conducted by Benchmarking Partners showed that companies using ERP had their inventory levels reduced by 33%, and their error rate in forecasting accuracy dropped from 52% to 29% (Saccomano, 1999). Reducing waste is another benefit of the system. For products with a shelf-life, the system is able to categorize by expiration date to reach first-expiry, first-out stock management (Payne, 2021). These are all ways ERP systems can influence inventory management by making the process more efficient and save cost, time, and resources.

System Implementation

Implementing an ERP system comes with foreseeable risks and complications that should be weighed by every business considering it. Assessing and planning for those risks at the beginning of implementation is a suitable approach to mitigate the effects for when the system is installed. Some obstacles that arise when installing an ERP software are the amounts of company support, length of time, and training efforts. Choosing the correct system for the business is an important place to start, since all packages do not offer the same advantages. Once a system is chosen, top management must be in agreement and invested in the decision. This support from the top level of management is essential in the success of an ERP system implementation (Schniederjans & Yadav, 2013, p. 376).

Depending on the system package chosen, the length of time to implement can vary. Having a plan and a project team dedicated to the success of the implementation can make the process smoother. The project team will focus on how to use the new software and how to perform business processes using the information system (Harwood, 2003). Bradley and Lee (2007) discovered that far too little time and money is spent on training employees to use the new software, effectively causing the employees to have negative feelings toward the change. The implementation has a greater chance of failing if the employees that use the system in day-to-day business processes are not comfortable doing so. Managing the risks involved with implementing an ERP system is critical to the success of implementation.

ERP vs. Manual Systems

The advantages that ERP can give to a business allows them to grow in ways a traditional inventory management system would not be able to do. With the improved order accuracy, availability, and fulfillment times ERP can provide, customer relations become stronger, contributing to greater brand loyalty (Stevens, 2020). In contrast, manual systems are more prone to human error, which can lead to misplaced products and longer fulfillment times. The coordination between departments in ERP yields another advantage that manual and non-integrated systems do not have. Magal and Worde (2012) state that for business processes, "effective communication and collaboration among the departments is essential to the smooth execution of these processes." ERP allows for more communication and information sharing with other departments than a traditional inventory management system. This means

real time information can be shared with departments such as sales and production through a familiar platform to all areas. The advantages that ERP gives over a manual inventory management system are wide reaching.

Conclusion

Inventory management affects many areas of business from marketing, production, sales, and accounting. An ERP system offers many benefits to inventory management. However, finding a system that can handle all the business processes is a challenging task that can come with complications. If handled correctly, ERP is an effective way to manage these integrated processes.

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Supply Chain Quality

Richard Pinkney
M.S. Global Logistics and Supply Chain Management Major

ABSTRACT

This research explores the various benefits of implementing quality processes into a supply chain. Supply chain quality is a critical component of achieving a competitive advantage in today's global environment. Through an intensive review of the literature and assessing various criteria of the top quality award models, researchers have determined eight critical success factors for measuring a firm's supply chain quality management. These practices will be examined, as well as ways various quality processes may be implemented and measured.

Types of Quality in Supply Chain Management

According to Dana and Spier (2018), the traditional view of quality uses a step-loss function to measure quality-related cost, considering only rejection costs when items go beyond specification limits. Taguchi (1986) redefined quality as the loss imparted to society from when the product is shipped and used a quadratic loss function to fit the quality loss cost. The cost for a product that is within specification limits is considered (Kaynak, 2017). Later, the step-loss function was shown to significantly underestimate the costs of items within specifications (Ebrahimpour & Sila, 2018). Suppose the quality characteristics of items produced through a process are normally distributed with a mean and variance. In that case, the optimal process means setting a cost reduction method, shifts the process mean slightly from the target to balance the costs outside the lower specification limit (LSL) and upper specification limit (USL) when minimizing quality loss (Chen et al., 2017).

Today, quality has become the essence of competitive advantage for all enterprises. As competition moves beyond a single firm into the supply chain, the focus is shifted from internal quality practices alone to integrating these practices with those of external supply chain partners (Yan, 2018). Several quality management models strongly emphasize the importance of leadership in a company's top management to success in quality improvement and business excellence (Cachon & Lariviere, 2019). Modern leadership theories have concentrated on transformational and transactional styles of leadership. Literature suggests that leadership expertise in the form of the transformational style is the crucial element to success in all quality management procedures and business excellence styles.

The basic definition of quality is fitness for use (Juran, 1989). According to Juran, this primary definition branches into quality, comprising those product features that meet customer needs and quality consisting of freedom from deficiencies (Bilotkach, 2018). In general, literature considers four stages to be the most important in the development of the quality concept: inspection, statistical quality control, quality assurance, and strategic quality management. These stages of the quality movement describe the significant paradigm shifts in quality management evaluation. Deming, Juran, and Feigenbaum have developed new statistical quality control concepts and quality assurance (Bauer et al., 2018). These theories were first accepted in Japan in the early 1960s and subsequently developed by Ishikawa, Taguchi, and others (Bauer et al., 2018). Feigenbaum specified the most important features of the new philosophy regarding quality assurance in 1961; he called the philosophy total quality control, which means a global approach to safeguarding quality control activities at the plant (Chambers et al., 2018). Total quality can be viewed as having a broader meaning than the quality of a product or service. Total quality cost-effectively correlates to the organization through a cross-sectional approach and processes holistically (Chen et al., 2017). Various approaches and practices have been designed since the 1970s in Japan and the 1980s in Western European countries that outline a new concept called total quality management (TQM).

Cachon and Lariviere (2019) noted that organization quality is measured based on product quality, environmental safety, integrity, and social responsibility. Therefore, quality is viewed from the overall performance perspective of a firm. Matsumura and Tomaru (2012) define TQM with three simple equations, in which each equation represents the three letters that comprise TQM. The authors' definition is as follows: Total = participation of everyone, quality = meeting customer requirements exactly, and management = enabling total quality conditions. Based on this definition, it can be stated that total quality is the goal and that TQM is the means to achieve the goal. Literature suggests that TQM philosophy has four main items:

1. The recognition of the primary role of the customer,
2. Top management's commitment and support,
3. Continuous improvement, and
4. Cooperative and participative effort in the quality improvement of all internal and external enterprise partners (Gao et al., 2018).

As competition increased and markets became global in the 1990s, supply chain management (SCM) began to gain in primary importance to respond rapidly, correctly, and profitably to market demands (Chen et al., 2017).

The Benefits of Quality in Supply Chain Management

In an effective supply chain network, members maintain and sustain a customer-driven culture by offering the right product in the right place at the right time and at the right price (Chen et al., 2017). Traditionally, supply chains' focus was on specific functions such as purchasing, manufacturing, and shipping to support logistics operations. The twenty-first century's competitive environment requires the delivery of cost, efficiency, high service levels, rapid response, and high-quality products and services. Supply chain quality is a critical component of achieving a competitive advantage in today's global environment (Dana & Spier, 2018). Since the 1980s, many organizations have widely adopted quality management (QM) as an

approach to achieve a competitive advantage. The adoption of the system approach implicit in supply chain management (SCM) necessitates externalizing the view of quality improvement by focusing on customers and developing suppliers (Kaynak, 2017).

As competition moves beyond a single firm into the supply chain, the focus on quality is shifted from the management of firms' internal quality practices alone to integrating them with customers and external supply chain partners and final customers in the marketplace (Tan & Tracey, 2001). The growing literature on TQM has repeatedly stressed the lack of leadership support as the reason for many TQM initiatives' failure (Igel & Vanichchinchai, 2018). Many researchers in the total quality and management literature have noted the importance of leadership in managing quality (Viator, 2001). The TQM literature contends that establishing and inventing systems that impact how products and services are produced, and fostering organizational culture, is the responsibility of leadership at the top of the organization (Bauer et al., 2018).

There appears to be a strong consensus among the founders of the quality movement regarding the importance of leadership to manage quality. As evidenced by their writings, all these founders view quality as a leadership responsibility and view TQM principles as being principles of leadership (Youngdahl, 2019). Deming was famous for observing that visionary leadership was essential for an effective QM program. Deming's argument that his views are statements of sound principles of leadership suggest that TQM's behaviors are themselves appropriate leadership behaviors (Youngdahl, 2019). According to Juran (1994), supply chain management (SCM) is a holistic approach that advocates the philosophy by which firms can operate inter-organizationally and merge both strategic initiatives and upstream and downstream processes to achieve business excellence (Zhang et al., 2018). SCM consists of internal practices, which are contained within a firm, and external practices, which cross organizational boundaries to integrate a firm with its customers and suppliers (Tsou, 2018).

Implementing Quality Process into a Supply Chain

From the operations management perspective, flow management and quality management are the supply chain's two dimensions (Yan, 2018). As a critical measurement of the supply chain, supply chain quality management (SCQM) not only requires quality management (QM) to be implemented internally within the organization of each member of the supply chain, but also requires communication, collaboration, and integration with both upstream and downstream supply chain members concerning quality (Mergen & Wen, 2019). SCQM requires the simultaneous integration of internal practices, upstream supplier quality performance, and downstream customer requirements (Porteus, 2018). Cachon and Lariviere (2019) conclude that supplier selection criterion (quality, delivery, and product performance) and supplier involvement in product development and continuous improvement programs have positive impacts on customer satisfaction. Over the last 30 years, studies have examined and assessed QM practices and various aspects of a firm's execution. Through an intensive review of the literature and assessing various criteria of the top quality award models, researchers have determined eight critical success factors for measuring a firm's SCQM performance (Rahim & Tuffaha, 2018). These factors and associated quality practices are listed as follows:

Top management commitment to quality: Acceptance of quality responsibility by top management; support, involvement in, and constant commitment of the company top management in all its functions to quality improvement; specificity of quality goals; designing internal functions to reflect the organization's mission; and comprehensive quality planning; importance attached to quality in relation to cost and schedule.

Focus on human resources: Provision of trade-related and task-related training for all employees; employee suggestion regarding improvements; open communications; employee empowerment; open employee participation in quality decisions; Total Quality Management responsibility of employees for quality; employee recognition for superior quality performance; and effectiveness of supervision in addressing quality issues.

Overall participation and teamwork: Implementation of all employee involvement in quality improvement activities; involvement and cooperation of all affected departments and the entire staff in design reviews; and top management support for group works and group goals rather than for an individual.

Customer focus: Frequent meetings with customers; customer visits to the plant; encouragement of customer feedback on quality; customer involvement in product design; use of customer need surveys; global customer satisfaction as regards products and services received; and a focus on achieving greater customer satisfaction.

Continuous improvement: Availability of information on quality performance and productivity; less reliance on inspection; statistical process control; preventive maintenance; conformity to product specifications that the product achieves at the end of the production process; employee self-inspection; automated testing; provision of statistical training; and clarity of process ownership, boundaries, and steps.

Cooperative relations with supply chain partners: Long-term relationships with suppliers; supplier involvement in product development; open communication and timely information sharing; availability of quality data; feedback of quality data; and fewer dependable suppliers.

Suppliers and logistics partners quality management: A quality rather than a price focus in selecting suppliers and logistics partners; supplier and logistics partner involvement in quality improvement; reliance on supplier process control; strong interdependence of supplier and customer; supplier quality control; and supplier certification.

Focus on sustainability and environment: Providing consideration to and actively promoting social responsibility and ecological sustainability both now and for the future; meeting and exceeding the expectations and regulations of the local and, where appropriate, global community; seeking out and promoting opportunities to work on mutually beneficial, society-inspiring projects and maintaining high levels of confidence with stakeholders; and being aware of the organization's impact on both the current and future community, taking care to minimize any adverse impact.

Firms pay increasing attention to product quality as quality issues permeate media reports. In 2002, nine of the top 10 recall actions worldwide were due to the quality deficiencies of

suppliers' products. Many quality-related scandals emerged in different industry fields, including toys, tires, and medicines (Teng, 2017). Both suppliers and buyers care about product quality, since high quality attracts more customers and benefits both via high demand; conversely, low product quality ruins product reputation and may incur a cost, which hurts both players (Teng, 2017). Developing appropriate contract forms to better manage suppliers' incentives for quality improvement is critical in the joint decision of product quality and retail price.

Measuring Quality within a Supply Chain

Since the supplier generally exerts quality improvement efforts, the associated effort cost is not verifiable to the buyer and cannot be included in contracts due to moral hazard and information asymmetry (Pazgal & Kuksov, 2017). There are two options for quality contracts. The first is the pay-before-performance contract, under which the buyer offers financial support to promote the supplier's incentive for quality improvement before the supplier does so. This financial support can be the buyer's indirect investment to facilitate the supplier's product quality improvements. For example, the supplier can be assisted by the buyer's personnel to improve his or her operations or receive education and training programs from the buyer to help their employees on quality improvement (Pazgal & Kuksov, 2017). The supplier can require specific financial support from the buyer for his or her quality improvement effort. This financial support for the supplier's quality efforts can be observed in traditional supply chains (Krishnan & Winter, 2018) and in health care supply chains in which the government pays a quality improvement subsidy to suppliers (Sheu, 2017).

Since the financial support is set before the quality improvement effort is exerted underpay before-performance contracts, it does not depend on the effort decisions and can be regarded as a side payment. In quality-related literature, there are two types of quality measures, within which the payments based on quality improvement performance are also different. The first type of quality measure is the conforming rate (or defective rate), which indicates the percentage of products that satisfy a specific product design specification (Hsu & Hsu, 2019). The payments based on quality improvement performance can be penalty costs of the returned/recalled defective units or the defective units' inspection costs (Hsu & Hsu, 2019). The second type of quality measure is product quality, which indicates the level of the product function. The payments based on quality improvement performance include sales rebates, order quantity discounts, or revenue sharing (Kaynak, 2017). All these payments depend on the performance, which is positively influenced by the supplier's quality improvement efforts. Like pay-before-performance contracts, pay-after-performance contracts are also applied, not only in traditional supply chains, but also in health care supply chains (Kaynak, 2017).

Another type of quality measure is product quality—and mainly consider the revenue sharing contract as an example of pay-after-performance contracts (Krishnan & Winter, 2018). Some scholars and practitioners have concentrated on organizing prices and order quantities between manufacturers and retailers in supply chain management (SCM). Each company in a supply chain (SC) should present a precise set of actions to achieve optimal SC performance. The key objective of each company is its profit, so a superior SC needs to coordinate different incentive mechanisms (Krishnan & Winter, 2018). Return policy, revenue sharing, and quantity discounts are conventional means for organizing conflicts between manufacturers and retailers.

Understanding Quality in the Supply Chain

In most existing literature, goods or products are generally considered perfect for ease of calculation and analysis (Pazgal & Kuksov, 2017). Due to the limitations of production technology or human error in workers' production process, some products may not be of good quality (Hsu & Hsu, 2019). Some examples are improperly cut garments, incomplete prints, and unstable electronic products. Many case studies have addressed the role of leadership in successfully managing quality at the top management levels, which examine issues such as the attitudes of top managers that are necessary for effectively managing quality (Jaber & Maddah, 2018), leadership styles used in implementing TQM in organizations, the impact of leadership roles on quality initiative, and the interrelationship between organizational culture and leadership (Kaynak, 2017).

The consensus of the authors of various case studies is that organizations that successfully manage quality tend to have leaders who can effectively involve people at multiple levels in the organization and motivate them to participate both in and as teams in the management of quality (Teng, 2017). This consensus among the various case studies relates to the value of the three core principles of the TQM philosophy and its utility in providing the basis for a theoretical framework that can make significant contributions to the leadership and TQM literature (Rahim & Tuffaha, 2018). The values related to the three core principles of customer focus, continuous improvement, and teamwork are imperative for leaders to successfully lead organizations through total quality transformations (Rahim & Tuffaha, 2018). An important facet of leadership in a vision of total quality is to broaden the power of decision at the lower levels of the managerial hierarchy by involving employees in quality improvement.

Meta-analyses of empirical quality management (QM) studies show that top management leadership is a crucial QM factor (Pazgal & Kuksov, 2017). Kaynak and Hartley (2018) propose that management leadership is directly related to five QM factors: customer focus, training, employee relations, supplier quality management, and product/service design. Management leadership is directly related to developing solid relationships with customers (Rahim & Tuffaha, 2018). Management provides the resources necessary for quality-related employee training and creates a work environment conducive to employee involvement in change. Roy and Samanta (2018) show a significant relationship between leadership and human resource management. Kaynak (2018) indicates significant relation between leadership and training and leadership and employee relations. Quality function development (QFD) was developed by Akao in Japan in 1966 and is defined as a method for developing a design quality aimed at satisfying the consumer and then translating the consumer's demand into design targets and major quality assurance points to be used throughout the production phase (Chen et al., 2017). As a significant benefit, when appropriately applied, QFD has demonstrated reduced development time by one-half to one-third (Chen et al., 2017). QFD is a cross-functional design tool that can be used to deploy the customer's voice from product planning, designing, engineering, and manufacturing into a final product (Hsu & Hsu, 2019).

The main goal of the House of Quality (HOQ) is to identify customer needs and weights for the service (WHATs), and then to convert these needs into technical characteristics (HOWs) (Tan & Tracey, 2017). Internal controls affect information quality, that affects supply chain partners, who rely on collaborative systems of information sharing, to reliably contract (Tan &

Tracey, 2017). Using internal control assessment as a proxy for internal control quality and U.S. GAAP-mandated prominent customer disclosures influences supplier internal control quality. Specifically, evidence has demonstrated that:

1. poor internal control quality increases the likelihood of subsequent customer-supplier relationship termination;
2. Timely control weakness remediation attenuates termination likelihood; and
3. Weaknesses affecting customer contracting drive the effect of internal control quality on relationship termination. (Chen et al., 2017).

Some results control supplier operational quality and performance and are robust to propensity score matching techniques, controls for reverse causality, and alternative proxies for relationship termination and internal control quality (Teng, 2017).

Many research findings are consistent with customers viewing strong supplier controls as essential contracting elements with significant implications for supply chain relationships. Supplier internal control quality might not significantly influence the probability that customer-supplier relationships will be terminated for several reasons (Cachon & Lariviere, 2019). Customers could substitute other governance mechanisms, such that internal control quality would have little influence on relationship duration. If customers influence internal controls through direct monitoring of suppliers, such monitoring could prevent supplier internal control quality from reaching a critically flawed level or reduce the value of information in public internal control disclosures (Bauer et al., 2018). Relationship termination may occur before the disclosure of such reports. Whether or not supplier internal control quality provides incremental information that affects relationship duration is an open empirical question. It is prevalent for multinational firms (MNFs) to move into a market by introducing products of superior quality, and then participate in local competition with domestic manufacturers (DMs) (Chambers et al., 2018). Many MNFs freely expose themselves to the risk of quality spillover by strategically sourcing from DMs to avoid the tariff burden. A DM and a MNF that strategically choose whether or not to source from the DM and characterize the tradeoff between the tariff burden and the potential loss due to quality spillover can be considered (Yan, 2018). Several researchers have analyzed the supply chain parties' partialities over the MNF's sourcing strategies and the influence of the government's tariff regulation and show that the MNF favors domestic sourcing when the danger of quality spillover is low. In contrast, the manufacturer usually sees an opposite preference.

It has been found that there exists a win-win zone where both MNF and DM prefer the MNF's domestic sourcing simultaneously. From the government's perspective, domestic sourcing always results in more output of high-quality products and more social welfare when quality spillover is sufficiently valuable (Youngdahl, 2019). Research shows that, even if the quality spillover is limited, more social welfare can be obtained under domestic sourcing if the tariff rate is low or high. The government can facilitate the incentive alignment between the MNF and the DM by adjusting the tariff regulation, which improves product quality and social welfare in the domestic market, although some danger zones exist where the regulation is inefficient (Viator, 2018).

In recent years, more and more large MNFs are seeking markets abroad, especially in emerging economies where demand for high-quality products is experiencing explosive growth. For example, a recent *Financial Times* report (2013) shows that China has become Nestle's second largest market, and Nestle's annual sales in China were doubled in 2012 (Tsou, 2018). The increasing demand for chocolate in China, annual growth of which is estimated up to 12% by Hersheys (Marketing China, 2013), has attracted many MNFs to enter China's market with chocolate products of high quality (Teoman & Ulengin, 2018). They are engaged in competition with domestic manufacturers whose chocolates are generally of lower quality. As the world's largest food company, Nestle has established subsidiaries in China and sold imported chocolate. Hollygee, one of the largest chocolate manufacturers in China, is reported as the main competitor of Nestle in the Chinese market (Viator, 2018).

Conclusion

This research study has discussed various types of quality processes that can be implemented into a supply chain. It has defined quality and described the benefits of having a quality program that focuses on total quality management within and throughout a supply chain. The research strongly supports the theory that a well-implemented TQM process can bring many benefits to nearly any type of business or manufacturer and the supply chain process.

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Enterprise Resource Management and SAP

Garrett Zollar
B.S. Acquisition and Contract Management Major

ABSTRACT

This paper examines and explains enterprise resource planning (ERP) systems, popular software management tools, SAP, and the specific data produced as a result of business process transactions within SAP. Project managers must be trained on ERP software and should understand how transactions and tracking benefit the project as a whole. The data presented originates from personal experience and the course textbook. While transactions in SAP may differ depending on how businesses choose to track data, the processes often produce the same results and similar traceable documents.

Introduction

Managers in the 21st century have a wealth of technology at their disposal in order to complete the objectives of their projects. For project managers to be successful, they must be able to control, track, and report on various aspects of the projects under their charge. However, project management fits into a more specific function of overall business process management. After understanding the functional organization structure and enterprise resource planning (ERP) software techniques, a project manager should be able to create an efficient and effective management strategy.

Enterprise Systems, Business Processes, and ERP Software

Enterprise systems can be more easily explained from the perspective of a manufacturing company. The goal of a manufacturing company is to source raw materials, produce a good or product, effectively maintain inventory, implement a logistics system to ship and receive, and provide support following successful delivery of the product. Magal and Word (2011, p. 3) define this entire end-to-end process as an enterprise system. A stronger emphasis has been placed on the significance of enterprise resource management in recent years due to the high impact on profitability and efficiency of a company.

Throughout the course of the paper, business processes and related topics will be discussed from a manufacturing point of view. The main business processes of a manufacturer are:

- Buy—Acquire all the necessary materials.
- Make—Use labor and capital to assemble and create the product.
- Sell—Deliver the product and facilitate financial transactions.

Procurement

The first process in manufacturing relates to acquiring the necessary materials to create the product. This request typically originates from a warehouse manager or other party that recognizes the need. Typically, a company has one or many vendors that provide specific parts or raw materials, and it is up to the sourcing manager to decide which vendor should be used. Often, this decision is based on which vendor has the lowest price offering along with sensible delivery times and an acceptable level of quality.

Production

The second business process in manufacturing involves the physical creation of the product. This process involves not just the capital equipment and management, but also the labor and direction involved. Production may be triggered either by a customer order or a material order in the previous step of procurement (Magal & Word, 2011, p. 8). The materials needed for the amount of product to be created is allocated accordingly by the warehouse, and the finished goods are prepared and stored for the final stage of the process.

Fulfillment

When a purchase order is received from a customer, the fulfillment process begins by locating the quantity of the requested items within the warehouse. This process also involves the financial transaction of invoicing the customer. When the customer has been invoiced and the order successfully picked and packaged from the warehouse, the order is then shipped to the customer by the most efficient channel.

Enterprise Resource Planning Software and SAP

An effective way to manage these business processes and more is through the use of enterprise resource planning software, commonly abbreviated as ERP. Using databases and wide spanning network connectivity, these software tools integrate manufacturing, warehousing, financial, human resources, and other departments of a business, allowing full access and control over quality and configuration. There are multiple ERP software platforms available for business. SAP, Oracle, and QuickBooks are a few. SAP consistently places at the top of most used ERP software lists. Originally founded in 1972, SAP (from System Analysis Program Development) was one of the first companies to develop standard software for business solutions, to include ERP tools (What Is SAP? | Definition and Meaning, n.d.). SAP set out to consolidate multiple business processes into a single database, known as transactions.

Transactions

Transactions within SAP are not simply financial exchanges that occur, but rather the result of business processes. For example, a buyer or other sourcing agent can create a purchase order during the procurement process to initiate a raw materials order through the use of ME21N: “Create Purchase Order,” as shown in Figure 1.

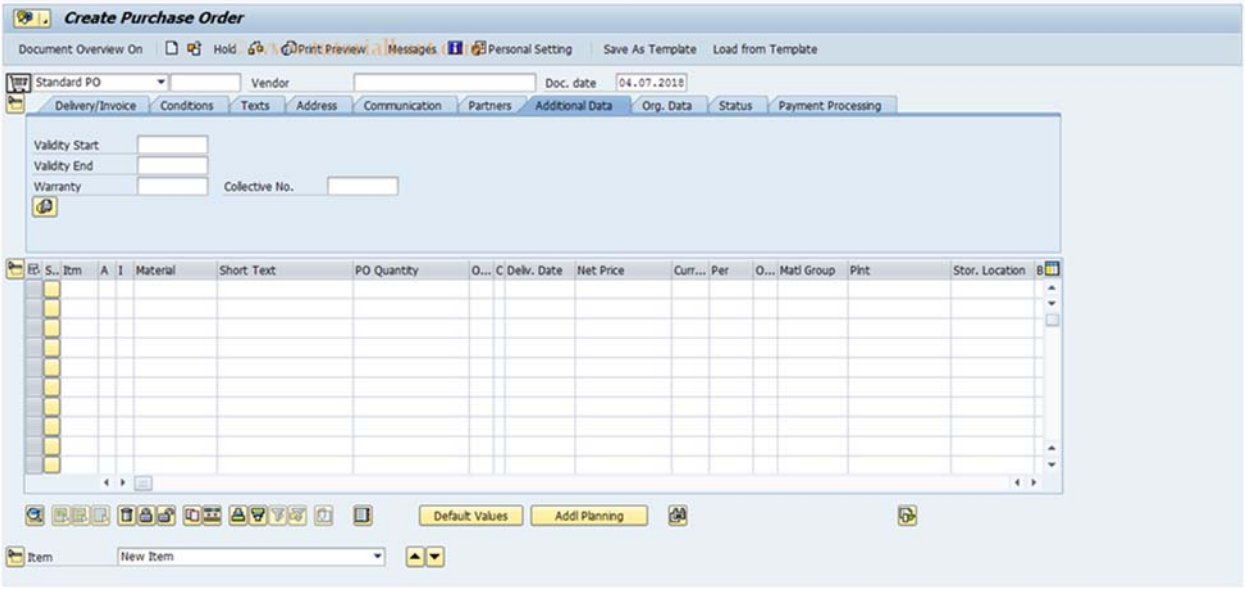

Figure 1—Example of ME21N in SAP

Source: https://www.tutorialkart.com/

Transaction Data and Documents

In SAP, transactions are logged within files known as transaction documents, each with a reference number that may be used across the software to both retrieve and store new data. Examples of transaction documents are purchase orders, packing slips, and invoices (Magal & Word, 2011, p. 36). These documents may be printed for physical transfer as well. For example, in order to successfully package and ship a product, a warehouse employee may need to print a hardcopy of a packing slip to accompany the order.

Financial transactions within SAP also create documents following process completion. Not only does SAP track logistic and material data, but financial statements such as the general ledger and invoices are also recorded. Project managers or accounting department employees can use these documents to better understand the financial wellbeing of either a specific project or the company as a whole. These financial transaction documents are known as "financial impact" or FI documents.

Another example of a transaction document is a materials document. Materials documents contain information about either a specific material or a base of materials (BOM), which is a detailed list of parts of a whole product. These documents are useful when tracking shipment, receipt, or configuration of a product.

Benefits of SAP from a Project Management Perspective

A project manager must constantly adjust project resources and deadlines based on the progress and financial health of the project. Using enterprise resource management software such as SAP, a project manager can monitor expenditures and order statuses. In a manufacturing environment, a project manager has to work closely with supply chain, logistics, warehouse, and financial employees to ensure accurate delivery times for the customer. Depending on the structure and size of a company, the project manager may or may not be responsible for creating purchase orders, monitoring delivery times, managing financial statements, and processing shipments. In most cases, the logistics and supply chain department deals heavily with purchase orders and goods receipt, while the accounting department handles financial statements and reporting.

Conclusion

Enterprise resource management allows a company to unite all business processes under a single database and, as a result, maintain the proper flow of information and creation of documents. Project managers should be familiar with the tools that allow the tracking and management of this information in order to ensure milestones are met and projects stay within the confines of a preapproved budget. SAP is a common ERP management software system that has consistently grown in popularity over the years. Transactions in SAP produce data in the form of virtual documents that are available across the entire global platform. Manufacturing businesses should embrace an ERP management system such as SAP and effectively train project managers to understand the transactions and use them to their benefit.

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The Use of Lean Processes in Current Business Cultures

Marion J. Pullum
M.S. Global Logistics and Supply Chain Management Major

ABSTRACT

Lean processing is one of the most widely used business tools. This research explores the dynamics of lean processing and its usefulness in the business sectors. This research examines the advantages and disadvantages of the process. Evaluating lean processing in applications as well as examining case studies garnered insight into its effectiveness. Overall lean processing can be an invaluable tool as long as managers do not lose focus on the employees.

Introduction

The business world is filled with numerous models and methodologies focusing on making businesses more profitable. Lean processing is a great example of one of these methodologies. At a glance, lean processing deals with trimming down the expenses to show a broader profit margin. Further studies reveal that the concept is more multifaceted. The Lean Enterprise Institute (2021) offers this thought regarding lean processing: "The core idea is to maximize customer value while minimizing waste. Simply, lean means creating more value for customers with fewer resources."

Is lean processing an effective business tool? Why aren't lean processes more widely used? The purpose of this paper is to provide a more thorough examination of lean processing and its use in current business cultures.

What Are Lean Processes?

Pangarkar and Kirkwood (2020) postulate, "Many people toss around the term 'lean' vigorously without a true appreciation for what it means or implies. For many, the first instinct is that lean is about slashing budgets to reduce costs. That is far from the truth." This seems to be an error that many individuals make concerning lean processing. Lean processing is driven by the customer's needs.

Flinchbaugh (2018) ponders, "Why does this focus on customer value matter? It should define how you design, manage and improve your work. It helps when you don't make the customer an abstract concept, such as a whole portion of the organization." This is more far-reaching than simply cutting waste to reduce costs. The customer is ultimately an integral part of all process goals.

The key function of lean management is to improve overall performance. This is done by evaluating processes to eliminate waste while still achieving quality and optimal service. At times, this is a trial-and-error process. It is imperative to identify what will work best and what can be more easily implemented.

Johnson (2018) maintains, "Lean methodology is a continuous process improvement approach that is used to identify and eliminate unnecessary steps (or waste) in a process." It increases the likelihood that the highest level of value possible is provided to the end-user, or customer, in the form of the product delivered through that process. There is a similar definition of lean processing across the board. It appears that the only real difference is its application to varying stakeholders. Lean processing can be applied to all organizations based on need.

Advantages and Disadvantages of Lean Processes

Advantages

There are many advantages to using lean processes. Anholon and Sano (2016) described the significant impact resulting from the implementation of lean manufacturing on inventory turnover, quality, production time, labor productivity, space utilization, production volume, flexibility, mix, and costs. These are not all of the advantages that one can hope to garner utilizing lean processes, but they are the most prevalently identified.

It is important to note that any situation can be studied and evaluated for lean processing and that all organizations can improve efficiency and reduce waste. The success of any organization is a satisfied customer. Creating a quality product enhances consumer satisfaction. Lean processing is an invaluable tool used to identify issues that may threaten this goal, as well as potential ways to overcome these issues.

Disadvantages

Anholon and Sano (2016) identified the five most important problem areas and the signs associated with indicators for measuring processes, people skills, clear procedures, integration of processes, and problems related to large numbers of products to be assembled (mix). Just as when discussing the advantages, there are similarities across business lines. This is not an exhaustive list of disadvantages.

There is a low margin of error in the process, but sometimes glitches occur. Employee dissatisfaction can play a role. Some things are really difficult to quantify, but lean processing is ultimately impacted by the employees and the procedures that are in place.

Process Improvement Models

Process improvement models are used to evaluate and tweak the processes that run businesses and services. Stakeholders are constantly looking for ways to save money and become more effective and expedient with delivering products and services. Two of the most widely used methods are the Six Sigma and the Experiential Learning Model. A brief overview will

provide more insight into understanding these models.

Six Sigma

Merwan Mehta is a professor at East Carolina University. He teaches in the College of Engineering and Technology Systems Department in Greenville, North Carolina, where he coordinates the Bachelor of Science in Industrial Engineering and Technology program and holds a graduate certificate in Lean Six Sigma black belt. Mehta (2019) explains that it is "widely accepted in process improvement circles that lean is the pursuit of waste reduction of all resources and Six Sigma is the improvement of quality of output through variation control of all activities that are undertaken by any business. Today, these two philosophies and their associated tools have melded into what leading proponents of both philosophies call Lean Six Sigma."

Lean Six Sigma is a process of eliminating unnecessary activities and resources, while at the same time trying to improve the quality of activities necessary to create products and services. Each process needed in the production of a product or service is examined for efficiency. The examination is needed to identify anything that hinders the process or services from reaching their optimal use.

Experiential Learning Model

The Experiential Learning Model (ELM) is another process improvement model. Chakravorty and Hales (2017) explain the process: ELM is a cycle of concrete experience, reflective observations, abstract conceptualizations, and active experimentation. This study finds that when the ELM cycle is repeated and documented many times over an extended period to continuously improve then the improvement is sustained.

The experiential models deal with people and how they learn. Hands-on learning seems to be the best learning for most people. People who participate in hands-on training tend to have a better grasp of the material and retain more knowledge.

Uses of Lean Processes

Lean processing is being used globally and is a universal concept. Problems may be specific to a location or an industry, but the process can be adapted to meet the needs of the business owner. Some processes can be more thorough than others. One of the largest disadvantages of Lean is the human element. Processes can be tweaked and fine-tuned; but individuals bring the unknown. This research will review randomly chosen venues and their experience with lean processing.

Hiring Processes

Lean processes can be used in a plethora of ways. Hiring processes can be streamlined and organization driven. The shortage of staffing at The King County Department of Adult and Juvenile Detention (DAJD) in Washington State is a good example. The DAJD had difficulties filling vacancies on time. It was taking one hundred and fifty-two days to fill a vacancy. Robson (2019) reports that "just over two years ago, DAJD's hiring process for corrections officers was excruciatingly long—five months—for applicants, human resources staff, and especially for the current officers who were feeling the crush of mandatory overtime as job vacancies languished."

The lean process began by examining the recruiting and staffing challenges which included officers retiring and the inability to timely fill those positions as well as mandatory overtime needed to counteract the shortage of officers. Next, everyone was invited to the proverbial planning table to map or evaluate the process. In lean terminology, this is called a value stream. The map included all of the processes and wait times. Wait times equate to wasted time in the process.

Once all of the data has been reviewed, a goal is set. In this particular case, a goal and a metric were created to track the data. For DAJD's hiring pilot, defining the metrics for success focused on how to reduce the timeline. The key milestones and stages in the hiring process were identified, and the baseline length of time for each stage was researched and established. The team then tested different ideas for shortening those stages, while tracking the individual applicants along the way (Robson, 2019). Ultimately, a goal was set to reduce the hiring time to 52 days. A year later, they achieved a reduction to 72 days, a 53% reduction in the hiring time. The team agreed that this was acceptable.

Manufacturing

According to Synchrono, since systematic processes like Lean and continuous improvement are quantified through ongoing, measurable gains, monitoring actionable metrics is key. Actionable metrics are measurements that manufacturers can quickly take action on to improve results (2017). Synchrono is a software system that helps to create successful lean manufacturing processes. For almost twenty years, Synchrono systems have helped discrete manufacturers, engineer-to-order manufacturers, and others manage constraints, improve flow and drive on -time production (2017). This software makes up an intricate part of the success of the Lean processes in its manufacturing realm.

The manufacturing of the GEIS-2 is another successful use of Lean manufacturing. The GEIS-2 is made up of an alloy called 'RO' which is a pure copper alloy and is an electrical part that is mostly for electrical application. The GEIS-2 consists only of pure copper where the conductivity has to be maintained as high as possible. The GEIS-2 machining takes place from three machines: two milling machines and one Vertical Machining Center (VMC). The GEIS-2, after machining, goes to tin plating which is subcontracted. The tin plating is done to increase the conductivity. As the tin plating is sub-contracted, the time study for GEIS-2 is done only up to tin plating and not beyond (Bilagi & Vasanthakumari, 2017).

The manufacturing issues are mapped, and the goals are identified. The processing data or value mapping stream included customer demand, cycle time, process time, change over time, number of operations, capacity, available time, uptime/downtime, quality or defects rate, number of product variations, batch size, and inventory level.

Bilagi and Vasanthakumari (2017) surmised, "The analysis and calculations make the best use of lean principles and pull the products from the system. The value stream-

ing map shows the improvements as:

- The products are pulled from the stores to the customer.
- The demand flow is from customer to the stores.
- The product flow is toward the customer from stores.
- As regards the tray usage, there is only 1.7 furnaces heat required per day to fulfill the whole monthly demand.
- When there is a scope of 1 tray as a WIP (work in progress), there is no need of production planning to pass on the schedules to all the departments. Therefore, the planning department has almost nothing to plan for the GEIS-2 product.
- There is always a WIP maintained as 1 tray, for which there is a scope of zero WIP in future.
- There is a proper flow of components as the tray keeps passing from one department to another."

This process may appear very lengthy, but it is important to include all of the pertinent variables. Lean manufacturing allows you to make decisions based on the variables that you can control. It also allows you to input variables needed to increase production.

Medical Field

Both public and private hospitals are increasingly under pressure to reduce costs while improving patient care across all medical disciplines and departments. Hospitals must become patient-oriented and rely on lean and agile principles to ensure they properly realign and integrate health care processes, helping to reconcile efficiency imperatives with patient needs and hospital mission (Nabelsi & Gagnon, 2017). Supply chain management and time management plants are paramount to supplying medical care to the masses.

The hospitals used in this research were located in Canada, but the issues were the same. Nabesli and Gagnon (2017) report that in an intensive care unit (ICU), nurses daily need a timely supply of medical devices, including infusion pumps, to administer critical drugs. Because of equipment shortages and mismanagement, it is often the case that a nurse must waste valuable time locating the necessary pumps, as they may not be in their original location; and if another nurse in the ICU needed the same asset in an emergency case, the problem can dramatically impact patient care.

The lack of supplies and equipment can have adverse, if not deadly, effects on some patients. Lean processes can assist with having needed drugs, equipment, and supplies on hand. Lean processes can be used to manage time. Most doctors' offices have moved to computerized office visits. Information is entered in real-time, eliminating the need for doctors to go back later to enter documentation.

In another instance, nurses in a large hemodialysis department were suffering from dissatisfied nurses. The nurses reported they were dissatisfied with the number of on-call hours, overtime hours, and the length of shifts worked versus what was scheduled. The RNs were reporting they did not have enough help to perform all needed duties within their scheduled shifts or even to take a break (Huckaby, 2020). After completing the Lean Six Sigma process, the following outcomes were yielded:

> The result for our acute hemodialysis department was a 12% reduction in overtime, moving from 16.9% to 4.4% post-implementation. The nurses can now take much needed breaks each shift. Employee satisfaction scores show an improvement from below the 10% as a baseline to the 50% to 90% for all NDNQI questions. We have experienced zero nurse turnover since the implementation of the time studies and the adjustment to staffing ratios, compared to the previous year's turnover of approximately 11%. The percentage of after-hour on-call coverage has remained constant at 2.3% (Huckaby, 2020).

It is important to look at all things that are connected to a particular issue. One must address all of the external and internal issues. Employees often get frustrated and stagnant because of all a job entails. They often feel disrespected and unappreciated. Acknowledging that there are other variables and working with stakeholders to resolve those issues create a much more harmonious workplace. Every issue may not be resolved totally, but it can be made better. Staff will be left knowing that they, as well as the patients, are valued.

The Rhetoric and Reality of Lean: A Multiple Case Study

This case study evaluates the similarities and differences between the written description of Lean and the actual application. Langstrand and Drotz (2016) begin the comparison by stating, "There is a stark contrast between the rhetoric and reality of Lean. The influential descriptions of Lean found in popular management literature are hardly recognizable when studying the actual efforts made under the Lean banner." They go on to report that the idea of Lean has a canonical version, but what we see is something different.

This case study challenges the assumption of Lean as a single and well-defined entity and, most importantly, the assumption that implementation of Lean will entail a certain range of predictable outcomes (Langstrand & Drotz, 2016). The case study is meant to compare and contrast the written version with the actual application. The case study was not meant to make conclusions regarding how Lean is applied or even its outcomes.

Lean is often presented as a set of tools. This case study is based on the extant literature of Lean in comparison to its empirical finding. Much of the literature maintains the thought that the entire system of Lean must be applied in order to reap the benefits. Results are inconclusive whether or not success is garnered by waste elimination or customer satisfaction. Lean is determined by both internal and external focus.

The concept of Lean is a relative tool in the hands of the decision makers. A large part of the Lean process involves value mapping streams. The stakeholders all get together to determine the company's perceived needs and set goals on where the company wants to be in the future. The values are set to enhance reaching those projected goals.

Implementing Lean-Outcomes from SME Case Studies

Pearce, Pons, and Neitzert (2018) reviewed some outcomes after implementing lean and they reported "the purpose of this work was to identify critical success factors for lean implementation. It followed two first-time implementations of lean in small to medium-sized enterprises (SMEs). The case studies spanned over four years, collectively. It was observed that the real problem with achieving lean success was not manage-

ment commitment but their ignorance of what they should commit to, hence a knowledge problem."

Case A

This case study was completed with a precision engineering jobbing shop in New Zealand that was in a struggling industry. Jobs were technical and skill-based, but the company was struggling in the declining market. There were about 20 people employed there. Productivity was low and problematic. The people in this group were trying to keep their businesses afloat. Management pressured the staff to bill and ship products by the end of the month. This caused chaos for two weeks out of the month, as well as an erratic workflow that resulted in low morale, lack of job satisfaction, low productivity rates, and poor staff retention.

Lean was mandated by management to be implemented by the staff, but the staff had little knowledge of the process. The company offered a two-day training program to select employees and offered video training to the remaining staff. Management set goals for staff to achieve, but did not put time and resources toward the success of implementation. Employees began to view lean as a fad. They became both resentful and resistant to the process. Pearce et al. (2018) concluded, "The result was that the company only achieved a minimal level of improvement but fell well short of implementing lean on a comprehensive scale."

Case B

This case study featured a manufacturer of customized products for the construction industry that employed roughly 20 people and used more standard processes. The researcher held a productivity improvement position. The people in the case study had better cash flow than the group in the previous study. They were looking at a boom in the market for which they were trying to prepare.

In this case study, the researcher prepared himself for developing the process. He became knowledgeable about all aspects of the business and the timeframes that it took to complete various tasks. He began to map processes, and gaps were filled in purchasing and logistics. Pearce et al. (2018) affirm, "The development of the change agent's knowledge was a key component." He was self-taught as to the ins and outs of lean development, but began to educate senior team members.

Although there was some resistance, most staff engaged with the process well; managers, however, resisted. They were unable to see the bigger picture behind the change. Pearce et al. (2018) concluded that there were additional concerns involving the ongoing education of management and the tendencies of tampering. Rather than give staff time to become proficient with the system, the administration would add additional control. The company was late implementing changes due to the change agent's lack of confidence. Despite this, the company was successful in achieving its goals, and the company was well prepared for the boom.

Conclusion

The goal at the onset of this paper was to answer two questions. Is lean processing an effective business tool? Why aren't lean processes more widely used? It is fair to say that Lean is an effective business tool in theory. Think of a finely tuned machine that is continuously looking for ways to eliminate waste and increase productivity and profit.

Why are people opting out of using such a tool? Lean can sometimes create more stress in the workplace. The constant evaluations to eliminate waste take away the human factor. Attention to processes makes the assessments more clinical rather than personal. The constant need for improvement does not make for an ideal and inviting workplace.

Overall, lean processing is a powerful business tool. Some would suggest that it is most useful to analyze processes. The bottom dollar is not always the best yardstick to measure success. Profitability is a must for businesses to remain viable; but at the same time, a business cannot run without staff. Lean processing seems to create an erosive environment for the staff.

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The Importance of Packaging in Supply Chain Management

Dr. Lionel O. Wright
Assistant Professor of Logistics, Interim Associate Dean, Graduate Program Director

ABSTRACT

The world's economic globalization has made it natural for previously domestically focused companies to move toward new global markets. In addition to extending their markets, companies acting in the worldwide arena also strive for cost reductions through scale economies in marketing, production, purchasing, and focused manufacturing or assembly operations, logistics, and product development. In a globalized market, competition has been tightened. Today, the competitors are making new ways to maintain and improve the quality of their products. At the same time, their competitors want to reduce the cost of producing products. Packaging, as an increasing concern in the business, can answer both goals of the company. This paper explores the function and the advantages of packaging in the world of business.

Introduction

Technology, greater accessibility to information, and global connectivity have improved the end consumer's overall experience (Aday & Aday, 2020). However, this has caused increased expectations and an even more complicated supply chain (Attaran, 2020). As manufacturers and retailers try to maintain the quality of their goods, so is their desire to save from the cost of production (García-Madariaga et al., 2019). These two goals are sometimes contradicting because maintenance, or even quality improvement, often demands a considerable cost (Kapoor & Kumar, 2019). Additionally, consumers sometimes judge the quality and value of the goods by merely looking at the packaging of the goods.

Consequently, the packaging is not just about product protection; in recent years, consumer expectations have evolved. There is a greater demand for manufacturers to make good packaging decisions, such as using recycled materials, or minimizing waste (Praml, 2010). Furthermore, firms now view packaging as a source of competitive advantage and an avenue for more profit (McDonald, 2016).

The value of implementing packaging improvements should not be underestimated (Kitz et al., 2021). Yet organizations may not recognize the bigger picture of how packaging improvements are leveraged for accumulative benefits throughout the supply chain (Meherishi et al., 2019). Consequently, packaging improvement initiatives are often limited to reducing packaging materials or squeezing prices from packaging suppliers (Olander-Roese & Nisson, 2009). Blank (2009) indicated that companies must progressively differentiate their products to create consumer perceptions of a product's relative advantage and attract first-time sales, since 72% of shoppers decide to buy something at the Point-Of-Purchase.

According to Bix et al. (2010), over 30,000 new products were introduced by packaged goods companies in the United States and Canada in 2002 alone, and 75% of the individual UPCs introduced failed within two years of introduction. It was interesting to note that the shortage of eggs during the pandemic was due to increased demand and lack of packaging for retail (Aday & Aday, 2020). Household egg consumption increased 40% in Argentina; sales of eggs rose by 44% compared to last year in the United States. Still, the U.S. Food and Drug Administration provided flexibility related to the packaging and labeling of eggs due to the insufficient availability of appropriately labeled retail packages to fulfill the demand and facilitate the distribution of eggs during the COVID-19 pandemic (FDA, 2020).

Delivering superior benefits to customers leads to customer loyalty, and it is a financial performance driver in retail sales (Wang, 2015). In general, the more benefits offered to consumers, the more successful the product (Wang, 2015). Thus, companies seek a competitive advantage by delivering consumer benefits; while customers select food products they perceive to offer the best benefits (Aliakbarian, 2019). Packaging for consumer goods is an essential factor contributing to product differentiation, which, in turn, contributes to competitive advantage (Bortolini et al., 2018). The increasing importance of communicating product benefits makes it imperative for food marketers to develop a better understanding of packaging design, since a product reaches almost all potential buyers and customers make most purchase decisions at the point of sale (Chen et al., 2020). Thus, product packaging (exterior presentation of a product) presents at the crucial moment when consumers make the buying decision (Freichel et al., 2020). Product packaging calls attention to a product and influences the consumer purchase process (Gardas et al., 2019). Marketing communications through packaging is critical for developing products that meet customer requirements; and it is essential to take advantage of packaging as a strategic marketing tool for the entire business, especially within a highly competitive food industry (Heising et al., 2017). Hence, firms have further fueled this interest due to ever-increasing market competition in different product settings (Kapoor & Kumar, 2019). Packaging can positively affect incoming materials, packaging process efficiencies, freight, storage, labor, and disposal costs. Therefore, a carefully planned and well-executed package design is one part of the promotion mix that can affect consumer perceptions of tangible and intangible product attributes and benefits that result in positive consumer response (Sari & Pratama, 2021).

Packaging Defined

Packaging is the science, art, and technology of enclosing or protecting products for distribution, storage, sale, and use (Sari & Pratama, 2021). Packaging also refers to designing, evaluating, and producing packages (Zhang et al., 2015). Package labeling, or simply labeling, is any written, electronic, or graphic communications on the packageing or a separate but associated label (Siemens, 2010). Packaging can be described as a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end-use. Packag-

ing contains, protects, preserves, transports, informs, and sells. It is fully integrated into government, business, institutional, industry, and personal use.

Packaging Types

Packaging may be looked at as several different types. For example, a distribution or transport package is the package form used to ship, store, and handle the product or inner packages (Lorenzini et al., 2018). Many categorize a consumer package as directed toward a consumer or household (Lydekaityte & Tambo, 2020). Packaging could be discussed in relation to the type of product being packaged: medical device packaging, bulk chemical packaging, over-the-counter drug packaging, retail food packaging, military materiel packaging, and pharmaceutical packaging. It is sometimes convenient to classify packages by layer or function: primary, secondary, or tertiary (Meherishi et al., 2019).

Primary packaging is the material that initially envelops the product and holds it. This is typically the smallest unit of distribution or use and is the package that is in direct contact with the contents. Secondary packaging is the material outside the primary packaging—perhaps used primarily to group packages together. Tertiary packaging is used in warehouse storage, bulk handling, and transport shipping. Palletized unit loads that pack tightly into containers are the most common form (Mahmoudi & Parviziomran, 2020). These broad categories can be somewhat arbitrary. For example, depending on the use, a shrink wrap can be primary packaging when applied directly to a product, secondary packaging when combining smaller packages, and tertiary packaging on some distribution packs (Mahmoudi & Parviziomran, 2020).

Importance of Packaging

According to Dang and Chu (2016), the most common packaging method consists of three stages and involves three levels: primary, secondary, or tertiary. Primary packaging is regarded as the first envelope to directly protect the product, while secondary packaging contains several primary packages (Chunt et al., 2018). Secondary packaging is used to protect the primary packaging. Several primary or secondary assembly packages on a pallet or a roll container are tertiary packaging (Dang & Chu, 2016). Packaging can significantly impact the efficiency of logistic systems and activities such as manufacturing, distribution, storage, and handling throughout the supply chain (Mahmoudi & Parviomran, 2020). In fact, the packaging design can directly affect the time that packaging operations require. Ultimately, packaging also affects product lead-time and due-date performance (delivery) to the customer (Chung et al., 2018). The packaging system is cross-functional since it interacts with different industrial departments, with their specific requests of how packages should be designed; these are often contradictory (Mahmoudi & Parviomran, 2020). Thus, packages have to satisfy several purposes, such as:

- *Physical protection*—the objects enclosed in the package may require protection from mechanical shock, vibration, electrostatic discharge, compression, and temperature;
- *Hygiene*—a barrier, for example, from oxygen, water vapor, or dust is often required. Keeping the contents clean, fresh, sterile, and safe for the intended shelf life is a primary function;
- *Containment or agglomeration*—small objects have to be grouped in one package for efficiency reasons;
- *Information transmission*—packages can communicate how to use, store, recycle, or dispose of the package or product;
- *Marketing*—packages can be used by marketers to encourage potential buyers to purchase the product;
- *Security*—packages can play an essential role in reducing the risks associated with the shipment. Organizations may install electronic devices like RFID tags on containers, identify the products in real-time, reduce the risk of thefts, and increase security.

Most companies use automotive parts logistics, returnable plastic or metal packages (including pallets, containers, racks). Compared to disposable packages, returnable packages can reduce the total amount of needed packages because of their long lifetime; this is more environmentally friendly and better from the point of view of sustainability (Zhang et al., 2015). However, returnable packages may have higher procurement costs, transportation costs, and other expenses caused by cleaning, repairing, storing, and managing. Moreover, the supply uncertainty caused by damage, theft, or misplacement incurs some costs and affects the supply of parts (Zhang et al., 2015). Therefore, returnable packages management is an essential issue in automotive parts logistics, especially for the automotive industry facing cost reduction pressure due to higher competition and lower profit margin (Zhang et al., 2015).

Development Considerations

Packaging as an essential component of the product affords various advantages to the consumers and more to the business owners (Alhamdi, 2020). Packaging offers three essential basic functions: protecting, offering convenience, and communicating. Primarily, goods are packaged for protection while being shipped from the manufacturer's warehouse to the end-user. Packaging protects the goods and the users, transporters, or anyone who may intend to open or feel curious about the product. Today, it is also required that packaging can protect goods contents from tampering (Sari & Pratama, 2021). Secondly, the packaging is used to offer convenience in pouring, squeezing, storing, stacking, and consuming by the users and transporters (Alhamdi, 2020). In addition, packs should be easily opened so as not to cause inconvenience for the consumers. Lastly, packaging should communicate details about its contents, proper handling, manufacturer, and other important information that shippers and consumers may use (Attaran, 2020).

Therefore, carefully planned and well-executed package design is one part of the promotion mix that can affect consumer perceptions of tangible and intangible product attributes and benefits that result in positive consumer response (Gardas et al., 2019). Package design and development are often though of as an integral part of the new product development process. Alternatively, the development of a package (or component) can be a separate process, but must be linked closely with the product to be packaged (Pitts & Witrick, 2021). Package design begins with identifying all the requirements—structural design, marketing, shelf life, quality assurance, logistics, legal and regulatory compliance, graphic design, end-user satisfaction, and environmental friendliness (Resat & Unsal, 2019). The design time targets, criteria, resources, and cost constraints need to be established

and agreed upon (Freichel et al., 2020).

Transport packaging needs to be matched to its logistics system (Chung et al., 2018). Packages intended for controlled shipments of uniform pallet loads may not suit mixed shipments with express carriers (Çankaya & Sezen, 2019). An example of how package design is affected by other factors is the relationship to logistics (Alhmadi, 2020). The sortation, handling, and mixed stacking make severe demands on the strength and protective ability of the transport packaging, when the distribution system includes individual shipments by a small parcel carrier (Meherishi et al., 2019). If the logistics system comprises uniform palletized unit loads, the structural design of the package must be designed to those specific needs—vertical stacking, perhaps for a longer time frame (Zhang et al., 2015). A package designed for one mode of shipment may not be suited for another.

The objectives of package development often seem contradictory (Siemens, 2010). For example, the policy for an over-the-counter drug might require the package to be tamper-evident and child-resistant. These modifications make the package difficult to open (Trigui & Abdelmoula, 2019). However, the intended consumer might be disabled or elderly and unable to open the package; hence, meeting all goals is a challenge (Wang, 2017). Package design may occur within a company or with various degrees of external packaging engineering: contract engineers, consultants, vendor evaluations, independent laboratories, contract packagers, and total outsourcing (Kitz et al., 2021). Some official project planning and project management methodology are required for all but the most straightforward package design and development programs (Aday & Aday, 2020). An effective quality management system and validation and verification protocols are mandatory for some types of packaging and recommended for all (Aliakbarian, 2019). Package development involves considerations for environmental responsibility, sustainability, and applicable environmental and recycling regulations. It may include a life cycle assessment that considers the material and energy inputs and outputs to the package, the packaged product (contents), the packaging process, the logistics system, and waste management. Knowing the relevant regulatory requirements for point of manufacture, sale, and use is necessary (Beitzen-Heineke et al., 2017). The traditional "three R's" of reducing, reusing, and recycling are part of a waste hierarchy that may be considered in product and package development (Beitzen-Heineke et al., 2017).

Disadvantages of Improper Packaging

In today's competitive marketplace, the damage rate of products is one way of describing the supply chain performance in different markets. Consumer/customer demands, as well as handling, storage, and transport conditions, influence the packaging of materials and designs needed. Additionally, packaging design and handling methods of products will affect the hazards and loads in a logistic system or supply chain. For example, a package holding 50 kilograms will be handled differently from a package containing 10 kilograms. The heavier package may be put on a man's shoulder, carried to the point of destination, and dropped there on the floor; while the lighter package might be thrown between the men handling the sack. Consequently, the handling method would have been selected differently; probably some tool, such as a trolley, would be used if the item had been packaged in a corrugated board box.

The significance is that the product and the type of package chosen, as well as the handling, storage, and transport, will influence the supply chain efficiency and effectiveness and, subsequently, the company profit. There is an interdependency between packaging design and supply chain design. Today, vast amounts of food are wasted due to improper packaging, transport, and storage, especially in less developed countries where large groups of the populations move to the cities to find an income. We need to compare the food waste figures between the Western world and these less developed countries: 2-3% vs. 50% respectively. Packaging, labeling, transit times, perishability, and damage or loss of cargo are all variables that impact shipment logistics and distribution. From an exporter's standpoint, the consequences of improper packaging can be devastating. Mechanical damage (breakage, crushes, nicks, and dents), water damage (seawater, rain, floods, and container sweat), and theft and pilferage account for 79% of claims for significant losses that can occur as a result of improper packaging during international transit. Unfortunately, these considerable losses are not covered by insurance. In contrast, the remaining 21% of claims were linked to fire, strandings, sinkings, collision, overboard losses, and jettison, which fall under the Perils Clause and are claimable damages.

Improper packaging of products can result in heavy fines. For example, all wood products used in international trade must be marked with the International Plant Protection Convention (IPPC) symbol. An unwary exporter was fined $10,000 in U.S. currency when it shipped goods on unmarked pallets to Finland (David & Stewart, 2008). A shipper of a three-fluid ounce (8.9 cl) bottle of perfume was fined $132,500 when the package broke, leaked in the plane, and "contaminated" other cargo (David & Stewart, 2008).

Improper packaging results in damaged merchandise, costing both exporters and customers millions, maybe even billions, of dollars. According to David and Stewart (2008), "From 1996 to 1999, the costs of goods damaged in transportation rose from U.S. $3.3 billion to U.S. $4 billion, or from 0.75 percent to 0.96 percent of Gross Domestic Sales, according to the Grocery Manufacturers of America. Such costs increased to 1.13 percent in 2004, but decreased to 1.04 percent in 2005. The primary cause of the decrease was attributed to 'improvements in packaging.' In its 1999 study, the trade group had reported that 44 percent of these losses were due to crushed, dented, or collapsed packages." The issue of theft and pilferage due to improper packaging is also becoming an increasing problem for cargo shippers. It is estimated that theft represents losses of at least U.S. $10 billion per year in the United States and U.S. $30 billion worldwide.

In law, there is no "exclusion for improper packaging." Generally, several vital risks are not covered by the marine insurance policy, including losses due to insufficient or improper packaging that does not protect the goods from the threats of transportation and the physical handling and environmental conditions at the port of import. Therefore, an exporter is still liable for damages resulting from improper packaging no matter which Incoterm or insurance policy is used.

Advantages of Packaging Optimization

In today's challenging economic climate, showing improvement to bottom-line results is crucial. Packaging can be leveraged to provide measurable cost savings and sustainability improvements, ensuring the success of supply chain improvement initiatives. These improvements can only be achieved through the adaptation and development of the concept of

packaging logistics. Optimization is needed to enable these improvements. Optimization can yield considerable opportunities for supply chain productivity improvements and substantial transportation cost reductions. According to Tom Blanck, a packaging manager at Adalis, a global provider of packaging solutions headquartered in Minneapolis, "Packaging optimization can yield considerable opportunities for supply chain productivity improvements and substantial transportation cost reductions" (Blanck, 2009).

Since logistics costs are typically five to ten times the cost of packaging materials, more significant financial benefits can be found in understanding how packaging affects transportation, handling, and warehousing costs. A small package footprint means increased packaging densities, greater throughput, and decreased handling and warehouse needs. When shipping trailers or containers that are not weighed out, there are opportunities to optimize package size, increasing cubic utilization, and obtain savings. On the other end of the spectrum, if trailers weigh out, there are alternatives to reduce packaging weight and maximize unit loads to minimize handling.

Shipping-related damage may also be a key target area for reducing costs. Returned shipments, rework or in-field repair add up to a significant increase in dollars, in addition to the cost of potentially dissatisfied customers. In an optimum situation, zero damage may also warrant a review. Packaging can be initially over-engineered, and opportunities exist later to reduce or remove unnecessary packaging. When optimized, there is a balance between the cost of damage and the cost of packaging.

Proper packaging is one of the first steps in becoming a lean manufacturer. It is an integral part of the supply chain. Today's challenge is to get as much product in the package that will also cube out whatever shipping method (trail, rail, sea, or air) is required. Another critical decision is choosing the right type of container for the product. The wrong packaging solution could cost millions in the cost of the package, excess labor, poor logistics, disposal, and excess warehouse space. According to *Supply Chain Digest,* "Many companies, especially in the consumer-packaged goods industry, are finding that what might be the easiest way to reduce transportation expense in the face of soaring fuel costs is to improve and reduce product packaging" (S.C. Digest Editorial Staff, 2008). For example, over the past year, club store retailers like Costco and Wal-Mart's Sam's Club have been experimenting with a new cylindrical design for milk cartons (taller and narrower) that enables them to load considerably more cartons per trailer, reducing transportation and production expense, and saving customers money. The new design eliminates the milk crates traditionally used to transport milk, and allows the new containers to be palletized, similar to traditional consumer packaged goods. The idea came from Creative Edge, a spin-off unit of Superior Dairy (Canton, OH), that creates food packaging designs. The new milk packaging has many benefits, as outlined in Figure 1. More than twice the amount of milk can now be loaded into a trailer. Superior Dairy says it has reduced its delivery frequency to initial retailer customers from 4-5 times per week to just 2 times per week. It substantially reduces packaging/loading time in the milk plants, thus reducing production costs.

Retailers can store about three times as much milk in a given store refrigerator, or conversely, free up to two-thirds of that floor space for something else. Early adopters pass some of those savings on to consumers, with prices generally being 10-20 cents lower per gallon versus traditional milk container pricing at Costco and Sam's Club. While some consumers are not wild about the new design, especially concerning the ease of pouring, that concern is not likely to stand in the way. Sam's Club, for example, has announced plans for full adoption of the packaging. "We're estimating it could be up to 11,000 trucks we're reducing on the road this year," said Daniel Book, Marketing Manager for Sam's Club. Figure 2, from the inventor of the new design, illustrates the

	TRADITIONAL JUG	NEW DESIGN	IMPACT
Packaging and Storage	Traditional milk jugs cannot be stacked and require crates for storage and transport.	The new milk containers have flat tops and ridged sides that allow multiple stacking, bound by cardboard bands and shrink wrap.	By eliminating the crates, the new containers store 4.5 gallons of milk in a cubic foot — 50 percent more than the 3 gallons stored in a cubic foot with the old jugs.
Maintenance	Plastic crates are reusable after being returned and washed.	After single use, the cardboard and shrink wrap are recycled.	No water is needed for washing, and no labor is required to load and return the crates.
Transport and Fuel	Four to five trips a week are required to deliver milk to a typical Sam's Club.	Two delivery trips are required each week.	Fewer trips by delivery trucks reduce fuel cost and consumption.

Source: Superior Dairy

Figure 1—Efficiency, One Gallon at a Time: Impact of New Design Model for Milk Cartons

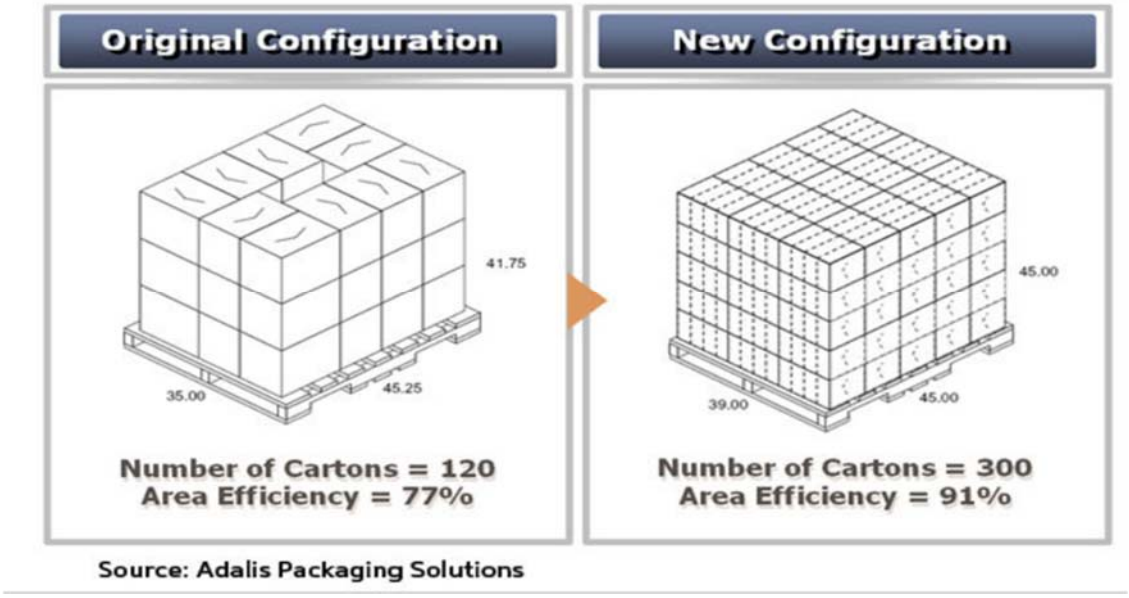

Figure 2—Inch Change Leads to Major Increase in Logistics Efficiency

design efficiency.

Third Party Utilization Trade-Offs

Collaboration with a third-party packaging expert can be beneficial. Supply chains are dynamic, and optimization is always a moving target. A one-time initiative or implementation of a specific process is unlikely to endure the constant changes of the supply chain environment. Regular review and assessment of the packaging supply chain are required, and outside experts can provide the necessary skills, perspectives, and support. Few companies have packaging as core expertise; therefore, utilizing external resources can be a great way to bolster in-house supply chain resources. For example, contract packaging services (CPS) package and label products that other companies manufacture. CPS perform specialized applications on a contractual basis. Some serve only basic assembly tasks, while others prepare and send products to customers, performing various activities such as taking orders, packaging items, shipping items, and reporting shipments. Additionally, package design services (PDS) provide design support for packaging development throughout the entire design cycle, from project planning to presentation to final testing. PDS utilize equipment or other resources to subject assembled packaging to standard or custom testing.

Conclusion

In today's challenging economic climate, showing improvement to bottom-line results is crucial. Packaging plays a pivotal role in the marketplace. The right (or wrong) package can mean the difference between success and failure. Yet this essential activity attracts little attention because it has been intensively used as a protective agent only. One of the prime factors that inhibit optimum efficiency and productivity is treating packaging activities as an individual task. In other words, traditional packaging is usually considered as a cost-driven center rather than a value-added component throughout the supply chain and distribution processes. However, achieving a competitive advantage and sustainable bottom line in the marketplace can be maintained through optimization. Whether firms decide to utilize an internal strategy or outsource, optimization can yield considerable opportunities for supply chain productivity improvements and substantial cost reductions. Packaging creates a ripple effect in the supply chain, and the benefits are numerous to all functions in the supply chain by utilizing packaging optimization.

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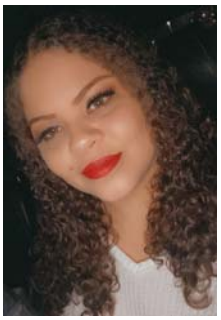
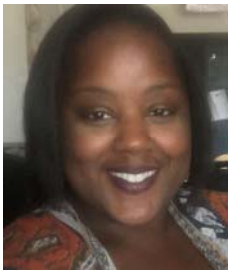
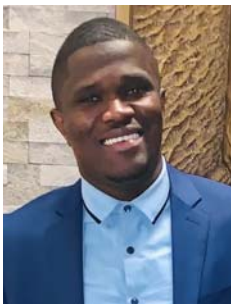


Shauna Clemons is a senior at Athens State University. She is pursuing her Bachelor's in Business Management with a minor in Logistics and Supply Chain Management. She currently works as a retention specialist for a telecommunications company and is co-owner of an American Bully Kennel Club, as well as a small transportation company. Upon graduating, Shauna's goals are to obtain her master's degree and a role in leadership that puts her in the position to share knowledge with employees and customers while simultaneously growing her business. In her free time, Shauna enjoys spending time with family, traveling, reading, and playing with her fur babies.



Alisha Collier is from Decatur, AL. She earned a Bachelor of Science degree in Liberal Studies and a Master of Education in Career and Technical Education from Athens State University. Alisha currently works in the healthcare industry as a licensed health insurance agent and licensing specialist.



Maweyah Deen is 31 years of age and originally from The Gambia, West Africa. He currently lives in Atlanta, GA. Mr. Deen graduated this past summer with a masters of science in logistics and supply chain management at Athens State University. He currently works for ABB as a National Account Manager. His hobbies include playing soccer and tennis, reading political books, and most importantly, spending time with family and friends.

Colleen Horstman is currently finishing her Associate of Science from Calhoun Community College in General Studies and is attending Athens State University for a Bachelor of Science in Logistics and Supply Chain Management. She also enjoys working for a LTL transportation company in Huntsville, Alabama.

Mikel Kabala is a recent graduate of Athens State University with a M.S. in Global Logistics and Supply Chain Management. He resides in Manchester, New Hampshire.

Victoria Moore is a resident of Madison, Alabama. She is employed as a Supply Chain Specialist for Northrop Grumman Huntsville, Alabama. She is pursuing a Bachelor of Science in Management with a minor in Logistics and Supply Chain Management. In her spare time, she enjoys spending time with her family and friends.

Richard Pinkney is a current resident in the Harvest, Alabama area and is employed by the Department of Defense as a construction cost analyst. He has a bachelor's degree in construction engineering technology from Missouri Western State University and MBA from Benedictine College. Richard is pursuing a master's degree in global logistics and supply chain management at Athens State University. Richard's goal is to become a global logistics manager after earning his degree.

Marion James Pullum, originally from Detroit, MI, is a Sr. Business Manager for a DoD contractor and Co-Owner of Agile Party Rentals LLC in Huntsville, AL. He has earned a B.S. in Marketing from Alabama A&M University as well as a certificate in Logistics and Supply Chain Management from Athens State University. Marion recently graduated with his M.S. in Global Logistics and Supply Chain Management from Athens State University. He is a member of Omega Psi Phi Fraternity, Incorporated and the National Society of Leadership and Success (NSLS). Marion is married (Shana) with one son (Austin) and resides in Madison, AL.

Dr. Charles R. Roberts is a Professor of Management at Athens State University and the lead instructor for Acquisition and Contract Management in the College of Business. He holds a B.S. in Business Management from Jacksonville State University, MBA in Business Administration from NOVA Southeastern University, and a Ph.D. in Business Leadership from Capella. He has held various other jobs at numerous locations with the Department of Defense (U.S. Army). In his spare time, Dr. Roberts enjoys spending time with his family.

Contributors

Dr. Kim Roberts is an Associate Professor of Operations Management in the College of Business at Athens State University in Athens, Alabama. Kim holds a B.S. degree in Chemical Engineering from the University of Alabama, MBA from the University of North Alabama, and Ph.D. in Instructional Leadership with a concentration in Instructional Technology from the University of Alabama. Kim has almost 20 years of experience in process engineering, operations management, and project management in the process industry sector. Her roles included responsibility for safety and environmental compliance, quality control, production and operations, logistics, cost improvement, and people development. She has led and served on multiple project teams implementing Six Sigma improvement projects. She now teaches various management and leadership courses in higher education and is certified as a Quality Matters Higher Education Peer Reviewer. In addition, she serves as a consultant designing, developing, and delivering process technology and management training to businesses. Her research interests include instructional technology, process technology, and leadership.

Dr. Lionel Wright is the Interim Associate Dean of the College of Business. Dr. Wright has over 25 years of active duty as an Army Logistician. He received his M.S. in Logistics and his DBA with a concentration in Global Supply Management. He holds multiple certifications and professional memberships. He is also the CEO of Wright Management Solutions LLC. Dr. Wright is married with two sons and two daughters. He resides in Hampton Cove, Alabama.

Garrett Zollar is an engineering project manager for Abaco Systems by day and a professional guitarist and singer by night. Born and raised in Huntsville, Alabama, he takes pride in being a third generation Athens State University student and future graduate. Currently, he is pursuing a B.S. in Acquisition and Contract Management. He also volunteers as a full-time member of the praise band at Heritage Church in Madison, where he finds fulfilment in leading others in worship. After graduating, Garrett plans to continue his education to earn his MBA and invest in real estate opportunities to further develop himself professionally.

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A College of Business Research Journal

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Contact Us

Give us a call for more information about this publication or Athens State University.

Athens State University
300 North Beaty Street
Athens, AL 35611

(256) 216-5352

Molly.Pepper@athens.edu

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