

The Benefits and Challenges of New Technologies in Global Supply Chain Management

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Besides being a term paper, one of my goals will be to identify and provide areas requiring a high level of focus while addressing new technologies adoption within an organization and its supply chain. Non-business professionals should be able to grasp the concept presented in this paper. The general tendency or spirit of this paper shall be to educate the reader or raise attention as to the critical high level considerations necessary in achieving high performance within an organization and its supply chain with the use of new technologies.

The information age has come with its benefits and challenges. New technologies have shown to be critical in enhancing organizational performance, competitiveness, increasing the bottom line and attaining customer loyalty in the current complex global economy. This paper will address how an organization should select and implement new technologies. In fact, new technologies need careful evaluation prior to adoption by a firm; this evaluation needs to take into account the entire supply chain including its global impact if applicable. First, we discuss the importance of **goals definitions and settings**; basically, an

emphasis in that planning would yield better results. In-depth **costs vs. benefits** analysis are greatly indicated. We will focus our analysis in areas such as the organization and supply chain **culture** (compatibilities, incompatibilities, strengths and weaknesses), and their **resistance to new tools**. This paper will clearly assess the **risks** involved and how to mitigate those risks. While considering new technologies, it is beneficial to the organization and the entire supply chain to identify and consider **users involvement** very early in the process. **Training** has always proven to be a critical success factor while undergoing such a supply chain transformation. Further more, the choice of an adequate **team, upper management support**, and **joint efforts** within the supply chain members for its smooth implementation will be discuss extensively. It is worth including **research and development** as a good number of firms are using it to identify and develop new technologies to be competitive and meet new challenges.

By providing an impact analysis of the key elements mentioned above to be used in improving an organization and its supply chain technology selection and implementation, this paper would be viewed as a high level guiding document.

This paper will start by highlighting specific trends in the local and global economies suggesting the inevitability of considering technologies to efficiently and effectively assert superior performance and competitive advantage of an organization and its supply chain.

This paper will not specifically address a specific organization or a type of organizations although some examples may be created or selected from past

publications and works with the purpose of illustrating this paper assumptions and supported recommendations.

Outsourcing to companies overseas, benefiting from low labor and manufacturing costs, penetrating and developing new markets in foreign countries brought tremendous potential for growth and profitability. To sustain new competitions, companies have no choice but to become global organizations. This huge step does not come with know challenges. In fact, challenges range from currency exchange, cultural misunderstanding, laws and host countries' policies, communication, time difference just to mention a few. However, global supply chain management (GSCM) remains one effective way to help overcome these challenges. In fact, if the impact of technologies is critical in local economies, it is more so in the global economy. To highlight this point, a GT Nexus white paper discusses global cost control in global sourcing.

In this paper, a GT Nexus defines the landed cost as the sum of the costs incurred to deliver an order placed overseas, and its early imperfections. GT Nexus shows how dynamic cost tracking leads to real-time costs updates as they are incurred and liabilities transferred throughout the supply chain accordingly. This approach allows for superior cost tracking resulting in sound pricing which in turn helps meeting expected profitability. In addition, dynamic cost tracking allows real-time marketing strategy/tactic adjustments. A second example is the use of communication which is very important to improve relationship and trust within the supply chain; time difference and distance do not simplify communication.

Here again, it is clear that the use of technologies such as VoIP, the Internet, e-mail systems, Electronic Data Interchange, ...etc are powerful tools to achieve a good communication level at competitive costs to promote good supply chain relationships and operation. These two examples highlight the criticality of technologies for the ultimate success of firm's GSCM in attaining its global goals.

Finally, this paper will provide a comprehensive conclusion summarizing the findings if any and restating the recommendations.

Goals definitions and settings

New technologies are always surfacing the market. Some are necessary and can bring superior changes increasing the bottom line and creating a sustainable competitive advantage. It is critical for most firms to remain current in technology parlance. New technologies often arise with new solutions such as rendering the flow of information more visible in the supply chain, a characteristic that facilitates the decision making process, reduces costs, improve lead time and cycle time. This is for instance the case as companies are moving from material requirement planning (MRP) to enterprise resource planning (ERP), with the integration of customer relationships management (CRM) applications into ERP systems or as standalone systems. As just-in-time (JIT) is becoming the goal for many firms, information flow visibility and control in real time is proving critical resulting in many applications flooding the market.

New technologies usually come with barriers and limitations. In addition, they

are not always the best alternative. Selecting a new technology or any technology shall take into account the supply chain as a whole. This selection effort is much more complex in the context of global supply chain where overseas partners with major cultural differences are present.

The multiple challenges involved in attempting to improve a supply chain dictate that specific goals be defined and set. Although, it may seem obvious to point an area or two as requiring improvement to enhance the rest of the supply chain, a firm needs to do more investigations. Areas truly requiring improvement need to be identified throughout the supply chain.

For instance an erroneous entry in the new information system say ERP may generate a wrong raw material lead time; this may require overtime and a premium cost for fast delivery, delays may be recovered at the expense of the profit margin. The firm may choose to increase the volume to reduce transportation cost in the future by truck load delivery preferring an improvement in the inventory level for potential lower inventory costs. Note that the firm, by not involving other members of the supply chain is not making the wrong entry visible and therefore is not fixing the problem. In a competitive environment, this firm pricing flexibility is limited. This example is showing how critical it is to include relevant supply chain members in determining area of improvement. It becomes clear that a supply chain team should be put together with the objective of identifying areas of potential improvement. For the sake of argument one can pose the question of knowing why the error was entered in the new ERP system. Was training available or overlooked? Once areas of

improvement are duly identified, they need to be defined and clearly understood.

If resolving an issue as simple as entry errors to the ERP can be as involved as described above, it suggests the complexity and criticalities in efficiently and effectively selecting, deploying and utilizing new technologies such are ERPs.

It appears that the goals definitions and settings need to be clearly understood not only by the firm but the entire supply chain. In addition, expectation brought by new technologies should not be overstated. When goals are clear and expectations rightly stated, supply chain members' responsibilities and focus easily follow.

Costs vs. benefits

As already eluded, new technologies come at a cost and a thorough costs-benefits analysis needs to be conducted. Joel D. Wisner et al. in their Principles of SCM textbook identified that the lowest cost of implementing an ERP system is four hundred thousand US dollars. This suggests the financial cost of acquiring ERP is pretty high on average. However, such an implementation involves the use of additional resources depending of rollout plan approach, salvaging of the old system, and risks associated with the transfer. In addition, maximum throughput of the new system may take time to be reached. Users' satisfaction, which is an important element in evaluating the cost of a new technology, is also very important. It appears that financial and non-financial costs need to be identified and listed. All non-financial costs that are not comparable to dollar figures need to be ranked. Conversely,

financial and non-financial benefits need to be identified listed and if needed ranked. Once this classification is available a thorough comparative analysis of costs versus benefits needs to be done. The tendency is to focus such an investigation and analysis to the firm itself including costs and benefits from the entire supply chain or excluding overseas supply chain members. The new technology is to serve the supply chain (SC) as a whole therefore costs and benefits affect the whole supply chain. The firm must not perform such analysis unilaterally or attempt to emphasize its benefits at the expense of other members. Decisions regarding the supply chain must be fair, beneficial, and reflecting accuracy to all members. Any inaccurate assessment of any SC member will result in a SC limitation.

Risks

In case where a good evaluation of the new technology is performed resulting in a sound decision to acquire or to forgo the technology, the supply chain will escape failures. However, a good acquisition decision does not guarantee future implementation and operation successes. The risk assessment should be comprehensive involving implementation and operation using the new technology. This evaluation shall be treated as a project risk assessment taking account of the entire supply chain and inclusive of all members. Risks affecting a single member of the supply should be considered as important as risks affecting all members or major members. Risk mitigation shall be undertaken. In this process members shall value each other contribution to the supply chain; if certain members are perceived unimportant, the chain may be

affected and the consequences sprayed throughout.

New technologies could be a source of sound competitive advantage. They can equally lead to chaos. New technologies are expensive and their implementation may consume tremendous additional non financial resources. These resources suggests opportunity lost; members organizations shall be very carefully considering all relevant costs and ensuring the alignment of new technologies to their overall mission and vision.

Such risk assessments are generally broad and complex mostly because they go beyond a single organization, country, or continent. They involve different languages, and cultural groups. For these reasons and many others not even eluded in this paper, it is critical to conduct a thorough risk assessment and mitigation as these activities highly contribute to future successes of the entire supply chain.

Culture and resistance to new tools

Brown (1998) defines organizational culture as:

“the pattern of beliefs, values and learned ways of coping with experience that have developed during the course of an organization’s history, and which tend to be manifested in its material arrangements and in the behavior of its members” (p9).

Culture is one the most complex component involved in strategy especially when the potential for culture change or adjustment is a possibility. Supply chain in a global scope is even more complicated because it involves different organizations scattered worldwide. Culture incompatibilities when not identified and acted upon may

seriously hamper the success of a supply chain.

Each organization should have a good understanding of its culture. This assumption is critical for supply chain members. Organizations need to identify their elements and characteristics within their culture that are strengths or weaknesses as an impact to future supply membership. Historically, failed joint ventures our partnerships were recorded; it is the case with Chrysler and Daimler. Similar failures are potential in a supply chain environment. It is in the best interest of all parties to share relevant culture related supply chain information. Such an exercise as sharing relevant culture related supply chain information could be one of the first tests in building trust which is critical as information flow and sharing are fundamental for supply chain successes.

The culture element is important because it impacts acquisition of new technologies at the organization level or and for the entire supply chain. Certain organizations like to operate the old way and new technologies are viewed as expensive and useless or simply unjustified.

ERPs have been successful in German for years in improving efficiency, creating visibility throughout the supply chain, eliminating waste, and enhancing ABC costing. Yet, it is perceived as useless by many in the industry and some managers have adopted it because their competitors have implemented it. It is truth that some reluctance is justified and ERP are costly. However, culture and resistance to the new tools have caused failures or avoidance of its acquisition (ERP).

It results that culture strengths and weaknesses to the supply chain need to be identified and worked upon and with

the goal to minimize incompatibilities and maximize areas of compatibilities. A good understanding of the benefits of improving compatibilities and forgoing a sound technology for the supply chain need to be clearly shared and promoted.

The era in which we are is sometime referred to as the information age; it is characterized by the internet, great progress in information technology, and the telecommunication offering real-time response. In addition, information is at the heart and is the soul of supply chain. It is also clear that such an era is bringing with it new technologies and new ways of thinking. Under such circumstances, human behavior is faced with challenging cultural changes that affect organizations and evidently the supply chain. Such impact is resistance to new technologies.

Resistance to new technologies could lead to major opportunity lost which translates to revenue lost. Not taking advantage of real-time response can lead to significant pricing error consequent to inaccuracy. For example, if organizations in a supply chain do not report costs as they are incurred, marketing may apply the wrong price to a product as they receive great pressure to quickly enter the market; the projected profit margin could easily erode when all costs are finally accounted for. In addition, resistance to new technologies also results in waste through inefficient use of resources. Essentially, employees use their time and canalize their energy to opposing decisions taken within their supply chain. Such resistance is counterproductive.

It is equally important to underline that not all firms have developed a culture that is hostile to new technologies. In fact, the majority are opened to new

technologies. Such firms and supply chains have an advantage over their competition in that fewer resources are consumed during the acquisition and implementation phase. In addition, training, management support are smoother and morale is likely higher because the employee has the perception of being valued by learning new tools and staying up-to-date of new technologies. Such a healthy environment positively affects the entire supply chain as members share new knowledge and maximize efficiencies throughout the supply chain.

Supply chain members shall create a working environment that fosters openness to change in general and changes involving new technologies in particular.

User's involvement

Early user involvement is important to reduce reluctance to new technologies within a supply chain.

Users for a new technology are the ultimate group actually using it. The more it is accepted and utilized, the faster a supply chain could start benefiting from it. Consequently, it makes business sense to invite users of the new technology early in the process. Users are more likely to know what they need to operate and when they are integrated in the decision process, they can provide insightful information helping for the acquisition decision. In addition, such participation commits users to the new technology. By participating to the process of acquiring, implementing and using new technologies, users are placed in a situation where they share the blame and the reward; this creates an incentive to succeed and help eliminates resistance.

Furthermore it indicates that the users are valued and increases their understanding of new technologies, how they will impact the supply chain and their career growth. Under such circumstances, users are motivated to help for the success of the new technology and the fear of losing their job is minimized.

Although it is established that early users' involvement is critical over the supply chain, this involvement needs to be organized. It is indicated that a number of users that understand the new technology and are representative of the users be part of the project of acquiring, inquiring and implementing the new technology. These representatives can play the important interfacing role providing users' inputs to the project team and bringing feedback to users regarding the new technology thereby play an educational role.

Training

Training is indeed very important for any new technology program. This step must not be neglected as it is often the case. Training needs to be planned. It shall not be limited to one of the organizations within the supply chain; in fact, all users within the supply chain shall be identified as well as the modules of the new tools that they will be using. Training contents need to be clearly prepared in a way that addresses the needs. Online training sessions, documentations, training videos, extranet or intranet forum discussions, and onsite classes are critical as appropriate. Knowledge development and sharing enhance any supply chain; cross functional training add flexibility and responsiveness which along with new technologies with chain event

management capabilities provides a step forward into the supply chain of the future. In fact, the Oracle Corporation and CSS international in their white paper “Lean Procurement: The Future of Supply Chain Management in a Demand-Driven World” talk about the concepts of “Lean Procurement” and “Chain Event Management”. These two concepts are supported by the following elements:

SUPPLY CHAIN EVENT MANAGEMENT

The implement of event driven supply management is gaining ground with new technologies that can facilitate the following:

- *Remove the obstacles to the free flow of information to your supply chain;*
- *Create real-time visibility into inventory in motion;*
- *Transition your supply chain from “push” to “pull” consumption based replenishment models;*
- *Manage by exception by providing your buyers and planners with proactive real-time, exception messages that strengthen their replenishment processes;*
- *Eliminate the long lead-times for critical materials and assemblies;*
- *“Cover the upside” of your material forecast;*

THE LEAN PROCUREMENT SOLUTION

- *Migrate from “push” to “pull”*

- *Develop a flexible and responsive supply chain*
- *Eliminate all waste in the procurement cycle*

These sets of elements show the criticality of new technologies for the success of the supply chain especially as it relates to information technology and information flow within the supply chain. It shall be clear that it is extremely difficult for an organization to master new technologies without sound training practices. In fact, it is counterproductive to take training lightly.

Team

The formation of a team to evaluate the new technology during the selection and or implementation processes is indicated. This team should comprise individuals representing each supply chain member and be led by employees of companies having the most at stake. This will provide a sense of compatibilities of members and facilitate supply chain integration as members’ surrogates work very closely together for a common goal in a micro environment. Lessons learned during such an assignment could be used beyond the new technology selection and implementation. It appears that new technologies bring supply chain members closer; this provides opportunities to build trust which is vastly needed for supply chain successes. Finally, it creates a sentiment of ownership which in turn generates an incentive to deliver a successful outcome.

Upper management support

For every project that is supposed to affect the bottom line, upper management support is everything. In fact, little can happen within an organization if there isn't any management support. New technologies shall be upper management driven. Management support should not erode or even diminish once the project is approved or the new technology acquired. A champion of the new technology needs to be identified within the upper management; such a champion will stand for the project and continuously advocate its contribution to the bottom line and show to potential antagonists how it aligns with the overall organization goal and strategy. Conversely, the champion can play a motivation role.

It is important to underline that those decisions of the supply chain and especially when acquisition and implementation of new technologies are involved, there are strategic decisions and champions within each organization affected within the supply chain needs to be identified. Having a champion in each organization within the supply chain sends the message to users or organization members that they are not forced by the most powerful organization. Champions will be in charge of communication official information within their organization as it relates to the new technology. In addition, they can negotiate details of the new technology in a way that does not overlook or diminish their interests but remain in line with their respective mission.

Joint efforts

The success of the supply chain is intimately link with the contribution of

each member of the supply chain. This statement is valid for success of new technologies within the supply chain. It is the responsibility of each member to do its share of the work. It is not enough to just communicate that every member should deliver what is expected of them. In fact, once the upper management has defined the goal, the project team must define expectations and responsibilities. Expectations must be attainable and measurable. In addition, efforts to ensure that expectations are understood must be present. Furthermore, an evaluation matrix should be developed in order to measure that results met expectations. Such an evaluation matrix must not be limited to financial performance but include parameters of main importance and strictly relevant in determining the overall health of the supply chain and the intrinsic contribution of the new technology to its improvement.

Supply chain members' performances will vary and their respective responsibilities will not be challenging to the same extend. In such circumstances, motivating members is critical; therefore a reward system that is fair could be a good incentive to encourage members.

Research and development

Benefits brought by new technologies to the supply chain are numerous and a good number was highlighted in this paper. These benefits are tangible and intangible. Many businesses have developed a sustainable competitive advantage relying on new technologies to the point that some are pairing up or have created research centers within institutions of higher education. Such is the case with FedEx, which is currently sponsoring research in the areas of

“Cycle Time Reduction in Complex Systems” and “Supply Chain Reengineering” at the University of Memphis, Tennessee. As a result of these research activities, FedEx has been able to be more efficient, centralized in its major distribution center of Memphis and few additional hubs. Note that findings from these works and subsequent technologies or systems developed have improved the Memphis/Shelby County Criminal Justice System (MSCCJS) has illustrated in the paper titled “From Cyclical to Systems Thinking: Cycle Time Reduction in Complex Systems”. An indirect consequence of FedEx research investments such as with the University of Memphis create additional jobs and helped MSCCJS among points mentioned here. From such actions FedEx could be viewed as developing some corporate citizenship and tremendous goodwill.

In fact, companies such as FedEx could be viewed as world leaders in supply chain with extraordinary distribution and logistics systems fully supported by information technology. It is clear that FedEx could not afford to lag behind in terms of new technologies.

It is also important to mention that the supply chain of the future will heavily rely on new and efficient technologies as organizations go green. The price of gas that is increasing daily and organizations are trying rightly or wrongly to show concern with regard to the environment, protecting the environment is becoming a strategic business goal for companies. Supply chain is an area in which a lot can be accomplished in a way of protecting the environment. For example, if the supply chain figures out a way to reduce transportations based on fossil fuel based energies they can protect the

environment. Tremendous areas could use research and development to create new technologies that will give their supply chain an edge in becoming green. For instance, how can packaging in general be improved to more easily be recycled? Supply chains that will develop a way of making money of their waste will acquire a sustained competitive advantage from it and such a step will be viewed as attaining agility and maturity.

Another opportunity may be energy conservation. A supply chain may team up with an institution of higher education to research ways to maximize energy savings throughout the supply chain. Such works could lead to new technology development and essentially reduce cost while protecting the environment.

Supply chain of the future should continuously invest in research and development to identify or generate new technologies. This will create more focus, leadership and differentiation ultimately resulting in a versatile and efficient supply chain.

Conclusion

Throughout this paper we have demonstrated the multiple challenges and benefits that go along side with new technologies as they relate to the supply chain in today’s very complex and competitive global environment. We have tried to provide examples illustrating these benefits and challenges. It has appeared that new technologies, when adequately selected and successfully implemented could transform a supply chain as a whole and each individual member organization in a way that increases the bottom line, provides a sustainable competitive

advantage, and facilitates supply chain integration and agility.

The initial expectation was results that only improve areas directly affected by a new technology; in the end, we have come to the realization that the exercise of identifying, developing, implementing, using, and improving new technologies for a supply chain environment brings sensitive, engrained, long range transformation going far beyond the supply chain. It is to be noted that such an exercise should be undertaken very carefully and comprehensively planned. Conversely, organizations must not shy away from new technologies because of the challenges involved; it is apparent that only those organizations that will be successful in implementing technologies that set them apart from competition and continuously add value to their products and services will survive new global market environment.

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Just-In-Time concept

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Supply Chain Reengineering: Improving
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