Empirical Evidence of the Impacts of Electronic Commerce on Supply Chain Integration in the Telecommunication Equipment Industry

Luc Cassivi¹,², Louis A. Lefebvre¹, Pierre-Majorique Léger¹ and Pierre Hadaya¹

¹ ePoly Centre of Expertise in Electronic Commerce
École Polytechnique de Montréal
www.epoly.polymtl.ca

² Department of Management and Technology,
Université du Québec à Montréal
cassivi.luc@uqam.ca

Abstract

This paper presents an analysis of the impacts of electronic commerce on proactive firms in the connectivity equipment industry. Electronic commerce initiatives identified in the optical connectivity value chain were analyzed for each of the four layers of the chain namely network operators, system integrators, assemblers and sub-assemblers. In this industry, electronic commerce has been and will continue to be driven by sectorial initiatives and proprietary supply chain platforms. The findings from our case studies indicate that electronic commerce initiatives primarily influence process and relational innovations. Results show that business-to-business electronic commerce is primarily a means to optimize supply chain configurations. The real benefits of electronic commerce come from end-to-end visibility in the supply chain, and from the implementation of demand-pull strategies for all levels of the optical connectivity equipment value chain.

1. Context

The objective of this paper is to present an analysis of the impacts of electronic commerce on a core group of proactive firms in the Canadian optical connectivity equipment industry. Many specialists consider the telecommunication equipment industry to be highly proactive in electronic commerce [8,10]. Indeed, industries related to electronics are facing now what many other industries will encounter two or three years down the road. This study is part of an international initiative sponsored by the OECD to identify and analyze best practices in e-commerce in 16 sectors from 8 countries. The research, which was conducted from September 2000 to January 2001, adopts the value chain methodology proposed by the OECD Electronic Business Impact Project (EBIP) [22]. The term “value chain” is used in this study to stress the importance of processes through which value is added to goods and services rather than on merely logistical aspects of supply chains.

The focus is on business-to-business electronic commerce in an environment where tighter long-term relationships between several tiers of suppliers are vital to the success of products or services [11,12]. Other types of initiatives are closely linked to the evolution of electronic commerce in the optical connectivity equipment industry such as supply chain management, supply chain integration and demand management [7]. In many industries, electronic commerce is often associated to the sales and procurement activities. In this case, electronic commerce has a broader influence and touches upon activities that go beyond traditional transactional processes namely collaborative product development, forecasting, production planning and inventory management.

Thus, electronic commerce embraces the ability to exchange information with partners and clients, and includes the adoption and use of tools and methods such as supply chain integration, electronic marketplaces and extended enterprises. The scope of electronic commerce initiatives in many industries requires important levels of openness and collaboration, which is not always present in traditional business models. The findings from this study suggest that electronic commerce can be a powerful tool for both innovation and efficiency in the telecommunication equipment industry.

1 The OECD defines electronic commerce as: “Electronic commerce refers generally to commercial transactions, involving both organizations and individuals, that are based upon the processing and transmission of digitized data, including text, sound and visual images and that are carried out over open networks or closed networks that have a gateway onto an open network” [20]

2 See, for example, [5]
cross-functional integration for selecting key processes and not necessarily the entire supply chain [14]. Integrated cross-functional supply chains require the alignment of sourcing decisions, manufacturing goals and customer needs [19]. In the optical connectivity equipment industry, supply chain integration is conducted through internally customized electronic commerce solutions as well as through the exploitation of a large industry-wide platform.

Supply chain partnering along with buyer-seller interaction and relationships have been identified as key research areas in business-to-business (B-to-B) electronic commerce [24]. Collaboration and flexibility within the supply chain have become increasingly critical for companies to compete and perform within their industry [16,17,27]. Supply chain management is foreseen as a tool to help the development of strong ties with suppliers and clients since the management and flow of materials within organizations is increasingly extended beyond the borders of the firm to involve upstream and downstream activities [15].

2. Research setting

Prior to our study, the EBIP methodology [21] was used to analyze the impacts of electronic commerce on several industries (music, flowers and textile) in the Netherlands. In 2000, the methodology was applied to more than 27 projects throughout 8 countries. The OECD launched this methodology knowing that the “economic potential” of business-to-business electronic commerce is huge and yet still poorly understood [21].

The methodology adopts a “transaction structure” that analyses how, when and why stakeholders exchange products and services while dealing with the evolution of new technologies to support their actions. The approach focuses on the relationships between the different partners of the chain and aims at analyzing the progress and changes within business practices and business structures when using electronic commerce. The objective is to examine the dynamics created within the chain rather than focusing on variables such as transaction costs and volumes. Without analyzing the transaction structure too closely, the methodology allows to examine the complex roles and impacts of intermediaries, which seem to be a source of new opportunities in electronic commerce projects [1,9].

According to the OECD methodology, three types of transactions support fulfillment in the value chain: transaction preparation, transaction completion and production support. Transaction preparation involves the input and retrieval of product/service information. Transaction preparation is mostly utilized in marketing and sales activities but it implies all information exchanges related to transactions. Both settlement and logistics shape up transaction completion. Activities such as ordering, billing and transfer of payments represent settlements. Logistics on the other hand refers to the exchange of products and services within the supply chain. With the emergence of electronic commerce, the OECD methodology generated the “production support” category to keep track of all the data mobilized for transactions related to design, production and distribution processes. Production support refers to information capture and information management capabilities. It also refers to market analysis and market development competencies.

As shown in figure 1, the three transaction types are analyzed within an innovation related framework. This framework also divides innovation into three distinct types as electronic commerce may stimulate product innovation, lead to process innovation and finally facilitate relational innovation.

Research in product innovation and process innovation has been conducted for many years. Knight [13] was one of the first authors to define these types of innovations in intra-firm environments. Product and process innovation go hand-in-hand when it comes to the adoption of emerging technologies [26].

On the whole, product innovation will assist and enable the development of new products and services. Different aspects of product innovations are analyzed in the OECD methodology notably product/service diversification, differentiation and customization.

Process innovation concerns the manner in which products and services are designed and produced. Davenport defines a process as "a structured and measured set of activities designed to produce a specific output for a particular customer or market" [6]. Lambert and Cooper also view a process as "a structure of activities designed for action with a focus on end customers and on the dynamic management of flows
involving products, information, cash, knowledge, and ideas" [14]. Noting the importance of a customer-oriented approach, the methodology examines the innovativeness of processes in different activities notably in design, logistics and manufacturing. Furthermore, it also explores in a more holistic approach the coordination and integration of the different sections of the company and different partners of the entire supply chain.

Inter-organizational relationships have been a key issue when it comes to using electronic commerce tools [25]. This relational feature is the third type of innovation examined in this study. Some previous work has identified trust and commitment to be important elements in logistics alliances and in buyer-supplier relationships [18,29]. Electronic commerce may tighten supply chain relationships, which sometime provoke problems and opportunities that are only discovered during the implementation of collaborative initiatives [2]. The methodology goes a step beyond and looks into new methods for buyer-seller interactions. It also examines numerous aspects including market segmentation, trust and loyalty.

It is important to note at this point that this research framework is oriented on the value chain of products and services. Hence, for this study, competitors, their clients and suppliers are evolving on the same value chain. This approach is critical for a common understanding of the effects of electronic commerce on the various participants of the value chain.

3. Research questions and methodology

For this study, the product related value chain is that of an optical connectivity equipment, which is a telecommunication device, comprising both hardware and software components used to transmit information in the form of light impulses along the fiber-optic medium. Understanding the product characteristics and the supply chain environment in which it is produced is essential to address the following questions:

1- What are the electronic commerce initiatives in the connectivity equipment value chain?
2- What are the impacts of these initiatives on the connectivity equipment value chain?

To address these questions, we have chosen the multiple-case embedded research design described by Yin [28], which states that several case studies seem preferable to a single case study. Considering that a wide variety of companies are involved in the supply chain, it is highly improbable that any one company may be representative of all. By definition, embedded case studies involve more than one unit of analysis, which is certainly more appropriate when faced with complex issues.

Seven companies covering all four layers of the optical connectivity equipment supply chain (described in section 4) were approached. In-depth interviews with sixteen individuals were conducted to complete the case studies. Apart from evolving in the same sector, one other common characteristic pertains to the fact that they are all involved in the realization of a common product, an optical connectivity equipment.

For a multiple-case design to be valid, a rigorous protocol must be followed: field procedures, interview guides and specifications for the case study report were carefully established. Several sources of evidence were used: focused interviews with key managerial personnel within each firm, data obtained from written internal reports and additional information gained from articles. The on-site in-depth interviews in particular proved to be a very rich and valuable source of data. The identification of electronic commerce tools and the analysis of e-commerce best practices were key activities in this process.

4. Industrial setting

The optical connectivity equipment industry is part of the telecommunication equipment sector, which encompasses all companies involved in the manufacturing of equipment and associated software that are intended to fulfill the function of information processing and communication in a network. As illustrated in figure 2, the value chain of the optical connectivity equipment industry consists of four layers, where at one end you have the network operators (i.e. the final users of the optical products) and at the other end, the sub-assemblers (i.e. the manufacturers of parts and components).

Network operators are the main users of optical connectivity equipment. These firms own and/or operate transport networks, metropolitan area networks and/or access networks. There are four major market segments that may be addressed by network operators: the local exchange market, the interexchange market (connecting local exchanges in different areas), the Internet service provider market, and the network service provider market. System integrators are the original equipment manufacturers (OEMs) of optical connectivity solutions. Main OEMs in this industry are very large multinational organizations such as Nortel Networks, NEC, Lucent, Fujitsu, Tellabs, Alcatel, Sycamore, Cisco and Ciena. Traditionally vertically integrated, OEMs are increasingly focusing on the knowledge-based portions of their value chains. Consequently, the primary roles of system integrators are investing in R&D to develop new products with higher capacity, managing relationships with clients and suppliers, and performing final integration of the solution to the clients’ requirements.
The value chain layer characterized by assemblers has been slowly transforming itself over the last few years. System integrators are gradually outsourcing their assembly to electronic manufacturing specialists (EMSs). The key factor in this shift in the electronic industry, and particularly in the telecommunication industry, is the EMSs’ ability to produce with increased flexibility and at a much lower cost than most traditional system integrators have been able to do in the last few years. They usually benefit from lower labor costs and stress the importance of heavy utilization of their manufacturing equipment while at the same time reducing set-up costs. The major players in the EMS market include Solectron (with $14.1 billion in revenues in 2000), Celestica ($9.8 billion), SCI Systems ($9.2 billion), Flextronics ($4.3 billion) and Jabil Circuit ($3.5 billion) along with a large number of smaller EMSs, several thousand worldwide, are obtaining large contracts from major OEMs.

Second-, third- and fourth-tier suppliers represent the last layer. While their functions are basically similar, the size and status of sub-assemblers differ. Some are owned and operated by large multinationals with worldwide contracts such as Thomas & Betts while others are SMEs with one or two major customers continuously booking orders. Component manufacturing and subsystem assembly are the foremost activities being carried out in this layer of the value chain.

The external and competitive environment of each layer of the value chain is shaped by a specific set of politico-economic, technological, industrial and market drivers. The following table summarizes these drivers.

In the upper row of table 1 are displayed four macro drivers that transcend the entire value chain. Economic slowdown has certainly been an issue in the industry and so has been the shift from voice to data. To be successful in this industry, manufacturers must rely on their capacity to constantly develop more efficient and more powerful telecommunication equipment and be the first to introduce them to the market. From the market point of view, demand fluctuation in that industry are particularly important and thus must be carefully managed. Each of the subsequent rows in table 1 describe the specific environment in a layer of the value chain. In the first layer, network operators, crumbling under huge debts and facing slower-than-expected growth in demand as well as increasingly stronger competition, are forced to postpone and even cancel infrastructure projects. Obviously, the actual temporary overcapacity of bandwidth transcends over the entire telecommunication equipment industry, which translates into large inventories throughout the supply chain.

The shift towards optical networking significantly disrupted the core competencies of system integrators. They had to migrate from a world where electrons are transmitted over copper to one where light goes through glass fiber. To succeed in this new environment, OEMs acquired in the recent years new start-up companies specializing in optical networking. Furthermore, increasing the level of outsourcing to EMSs while improving flexibility and response time is not an easy task and requires an integrated supply chain. System integrators need to opt for demand-driven strategies namely collaborative planning and inventory management throughout the supply chain. Managing the supply chain as one extended enterprise is seen as the only way to survive, as competition increases between electronically integrated networks of companies.

![Figure 2- Optical connectivity equipment value chain](image-url)
Table 1- Drivers of the optical connectivity equipment value chain

<table>
<thead>
<tr>
<th>All layers</th>
<th>Technological drivers</th>
<th>Industry drivers</th>
<th>Market drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic slowdown</td>
<td>Adapting technical competencies to harness the convergence of voice and data</td>
<td>Industry consolidation</td>
<td>Managing demand fluctuation</td>
</tr>
</tbody>
</table>

| Layer 4 Sub-assemblers | Use of IT to achieve manufacturing flexibility | Compete on quality and fulfillment cycle times | Move up the value chain by offering module and extending product portfolio |

| Layer 3 Assemblers | Use of IT to achieve manufacturing flexibility | Build flexible worldwide manufacturing network | Develop long-term partnership with integrators |
| Extend technological capabilities to offer more value to OEMs | Benefit from economies of scale by leveraging client buying power | Build a portfolio of clients to reduce fluctuation risks |

| Layer 2 System integrators | Political pressure from lobby group for government R&D support | Attract, acquire and retain knowledge in optical networking | Manage demand slowdown |
| Create a demand-driven extended enterprise | Convince network operators to upgrade their infrastructure (from SONET to DWDM) |

| Layer 1 Network operators | Deregulation telecommunication providers | Reduce configuration/maintenance cost | Revisit planned infrastructure project |
| Temporary over capacity of bandwidth | Over expectations of the actual customer functional needs |

Two important trends have emerged for the assembler layer. First, along with the guarantee of long-term relationships with system integrators, EMSs build up flexible networks of manufacturing plants. These manufacturing facilities are spread around the world, providing faster services to OEMs. With an ever-growing pool of customers, EMSs benefit from a far larger asset turnover and buying power than any OEM alone could develop with its manufacturing plants. Second, in order to distinguish themselves, EMSs have developed the ability to provide cradle-to-grave design, engineering, sourcing, and fulfillment services, therefore moving up drastically on the product value chain.

Sub-assemblers in the telecommunication industry (and also in other high-tech industries) have been working in a very competitive environment over the last few years. Aware that the supplier base was too large and difficult to deal with, OEMs and EMSs are progressively reducing it to a few key suppliers. Hence, knowing they could easily lose their business to a competitor, sub-assemblers face constant pressure to supply high-quality modular products and to extend the portfolio of products. On the other hand, once they have proven they can handle the stringent requirements of customers, OEMs then engage this selected supplier base in long-term relationships. Although the Y2K bug has prompted the implementation of enterprise-wide information systems such as ERPs, small sub-assemblers still lack the data integration required to work in this environment.

5. Results

Two different levels of results are presented in this chapter. A synthesis of the current and future impacts of process, product and relational innovations on the entire value chain is first presented. The focus is then placed on the system integrator layer where a graphical summary of the main impacts of the e-commerce initiatives is illustrated. Particular attention is paid to how the transaction structure has been affected by these innovations and how it will evolve in the future.
5.1 Electronic commerce impacts on the value chain

Using the OECD framework, figure 3 summarizes the actual and future effects of electronic commerce for the different layers of the value chain. By cross-analyzing the different case studies, the impact of electronic commerce is evaluated and classified according to the types of innovation and fulfillment support activities.

The analysis of this figure reveals a pattern in which we can induce three major findings. First, system integrators have a critical role in the adoption of e-commerce in the optical connectivity equipment value chain. Secondly, e-commerce mainly impacts process innovations. Finally, electronic commerce strengthens relationships between business partners.

Figure 3 illustrates the strong influence of a system integrator on the value chain. This OEM drives the adoption of electronic commerce tools and applications in its supply chain and is well positioned to urge its business partners to adopt these new tools, thereby achieving a rapid diffusion of business-to-business electronic commerce in the value chain. As we move up to layers 3 and 4 of the value chain, the impacts of e-commerce on assemblers and sub-assemblers are similar to those on systems integrators but with less magnitude. This gradual diffusion of electronic commerce is in part due to the necessity for suppliers to adopt the required internal systems to support doing business electronically. On the other hand, the effects of electronic commerce on network operators are less significant due to the complexity of the product.

The findings of all case studies also clearly reveal that electronic commerce particularly influences process innovations in the optical connectivity equipment value chain. The current and future impacts of business-to-business e-commerce on process innovations can be understood by two main trends: use of visibility tools to improve transaction preparation, and implementation of demand-driven supply chain strategies to complete transactions.

Visibility in the supply chain is achieved by making accurate information, such as forecasts, schedules and production capacity, accessible to all members of the chain. Current electronic commerce initiatives have improved visibility, mostly between the assembler and sub-assembler layers. Web-based forecast tools enable sub-assemblers to better plan production and anticipate fluctuations in demand. On the assembler side, schedule and capacity visibility allow for better anticipation and tighter management of shortages.

However, the real benefits will come with end-to-end visibility in the supply chain. With large sectorial platforms, e-commerce initiatives will be extended to second- and third-tier levels of suppliers, thus providing sub-assemblers with some of the benefits currently derived by assemblers. On the upper end of the chain, visibility tools will permit the system integrators and network operators to exchange accurate information relative to demand, thus improving forecasting along the whole supply chain. Network operators and system integrators are trying to merge their functional systems in order to exchange critical information such as delivery dates and tracking, inventory levels and anticipated demand.

Customization and diminishing lead times are forcing the implementation of demand-pull strategies for all levels of the optical connectivity equipment supply chain. In order to quickly produce only what has been sold, system integrators will want to keep inventories at a minimum and rely on efficient procurement cycles to fulfill their needs. Business partners in this value chain are replacing inventories with on time information. As such, visibility between the business partners is not sufficient to support a demand-driven strategy. Advanced collaboration tools are needed to fully integrate planning and scheduling activities. As of now, system integrators and their assemblers have been the greatest beneficiaries of electronically supported demand-driven strategies by
significantly reducing total cycle times and inventory levels.

However, in order to really benefit from the e-collaboration tools, sub-assemblers may have to rethink the way their internal systems are designed. For example, shorter response times require more flexible planning systems such as Advanced Planning and Scheduling (APS) tools that can run different planning scenarios on a daily basis. Moreover, large industry initiatives will help sub-assemblers create tighter links with their own suppliers and thus achieve inventory and cycle time gains. In the near future, assemblers and sub-assemblers will merge their systems making it possible to dispatch work to the production lines of all business partners. Such collaboration requires real-time information sharing on matters such as manufacturing capacity, inventory levels and distribution constraints. Furthermore, the use of methodologies and tools such as Collaborative Planning, Forecasting and Replenishment (CPFR) should extend demand-driven efficiencies throughout the chain.

Finally, another important finding of the case studies is that electronic commerce in the optical connectivity equipment value chain strengthens existing relationships between business partners. The learning process required to develop efficient electronic collaboration between the supply chain partners constitutes an important switching cost for the assembler. Indeed, sub-assemblers adopting electronic commerce need to invest time and money to adapt their internal processes and systems and develop the human competencies needed to handle these new challenges. Once the sub-assembler has made the effort to adapt itself to these new requirements, it is very unlikely that the assembler will want to put an end to their relationship. This explains why system integrators tend to develop close, long-term partnerships with a narrower supplier base. This trend is reinforced by the fact that faster cycle times often compel suppliers to invest in infrastructure in order to bring their manufacturing plants closer to the assembler’s facility.

5.2 Electronic commerce impacts on the system integrator layer

With the ability of system integrators to diffuse electronic commerce throughout the chain, the extensive data collection conducted in this layer appears to be quite revealing on how electronic commerce will evolve in the years to come. This section provides more detailed results of the actual and future impacts of e-commerce on the system integrator layer.

First, to fully grasp the implications and effects of electronic commerce on the system integrator layer, it was important to identify and understand the e-commerce initiatives put forward by the different members of the chain. Table 2 summarizes the 9 different initiatives that affect the system integrators.

<table>
<thead>
<tr>
<th>E-commerce Initiatives</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Informational platform</td>
<td>Serves as a collaboration platform for all value chain partners by exchanging basic information.</td>
</tr>
<tr>
<td>2. Supply chain visibility tool</td>
<td>Ensures the exchange of information between business partners (forecasts, supplier’s internal capacity and inventory status).</td>
</tr>
<tr>
<td>3. Web purchase orders</td>
<td>Enables the transmission of purchase orders through a web interface.</td>
</tr>
<tr>
<td>4. Web replenishment</td>
<td>Orders directly from the shop floor on a demand-driven system.</td>
</tr>
<tr>
<td>5. Web shipping</td>
<td>Collects shipping information from suppliers and deliver directly to the final customer, i.e. network operators.</td>
</tr>
<tr>
<td>6. Billing and payment</td>
<td>Executes billing and payment over EDI and is linked electronically to the firms’ internal systems.</td>
</tr>
<tr>
<td>7. Technical file transfers</td>
<td>Transfers files (blueprint of the required part in a standard digital format) through an FTP server or directly by encrypted e-mail.</td>
</tr>
<tr>
<td>8. Consortia-led electronic marketplace</td>
<td>Regroups large companies and their suppliers on secure electronic platform to exchange product information, conduct transactions online and adhere to other added-value services.</td>
</tr>
<tr>
<td>9. Web configurator</td>
<td>Enables network planners to configure telecommunication equipment online with the use of a web-based expert system.</td>
</tr>
</tbody>
</table>
A majority of these e-commerce initiatives were developed internally by system integrators to suit the very specific needs and imperatives of the optical equipment supply chain. The first seven tools are presently exploited by the OEM and its business partners. The consortia-led electronic marketplace is currently in the design phase and should be introduced in the not too distant future. The development of the web configurator has been postponed due to the recent downturn in the sector. To the exception of billing and payment, the initiatives are all web-based and a majority of these tools are linked directly to the OEM’s ERP (Enterprise Resource Planning) system.

Figure 4 positions the impact of each e-commerce initiative in the OECD framework. Some of the initiatives, particularly the planned initiatives, cover several areas of the matrix and have greater impacts on the value chain. For example, electronic marketplaces have an effect on both process and relational innovations for both transaction preparation and completion. A concentration of planned initiatives in the middle layer of the matrix reveals greater e-commerce impact on process innovation. Along with the initiatives, the matrix provides some examples of e-commerce impacts. They can be summarized by effective communications between business partners at the transaction preparation stage (e.g. collaborative forecasting), by faster and more reliable methods of completing transaction (e.g. direct replenishment from shop floor), and by efficiently managing inventories and engineering data to support production (e.g. vendor-managed inventory).

Interviews conducted during the OEM case study led us to acknowledge two important trends in the development of future e-commerce initiatives in this sector. First, the introduction by system integrators of web-based product configurators will transform the way optical connectivity equipment are sold to network operators. For the sell side, this kind of “self-service” configuration tool will facilitate the transaction preparation and completion by reducing human intervention in the ordering process. For the buy side, the

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### Figure 4 - E-commerce impacts on system integrators (layer 2)

<table>
<thead>
<tr>
<th>Transaction preparation</th>
<th>Transaction completion</th>
<th>Production support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product innovation</strong></td>
<td><strong>Process innovation</strong></td>
<td><strong>Relational innovation</strong></td>
</tr>
<tr>
<td><strong>Future impact</strong></td>
<td><strong>Actual impact</strong></td>
<td><strong>Future impact</strong></td>
</tr>
<tr>
<td>• Enable e-configuration for customization of telecommunication equipment</td>
<td>• Enable online ordering of complex products</td>
<td>• Reduce required inventory levels for layers 2 to 4.</td>
</tr>
<tr>
<td><strong>Future impact</strong></td>
<td><strong>Actual impact</strong></td>
<td><strong>Future impact</strong></td>
</tr>
<tr>
<td>• Accelerate negotiation and supplier’s response time</td>
<td>• Ensure transaction reliability and accelerate payment</td>
<td>• Optimize the entire supply chain by integrating 2nd and 3rd tiers</td>
</tr>
<tr>
<td><strong>Future impact</strong></td>
<td><strong>Actual impact</strong></td>
<td><strong>Future impact</strong></td>
</tr>
<tr>
<td>• Enable a real demand-pull system with first tiers suppliers</td>
<td>• Enable direct delivery from layer 4 to layer 1.</td>
<td>• Seamless integration</td>
</tr>
<tr>
<td><strong>Future impact</strong></td>
<td><strong>Actual impact</strong></td>
<td><strong>Future impact</strong></td>
</tr>
<tr>
<td>• Increase flexibility and scope of the supplier base</td>
<td>• Integrate electronically 3rd party service providers</td>
<td>• Create common interface and mechanism to capture and manage information</td>
</tr>
<tr>
<td><strong>Future impact</strong></td>
<td><strong>Actual impact</strong></td>
<td><strong>Future impact</strong></td>
</tr>
<tr>
<td>• Develop trust enhancing practices</td>
<td>• Trust</td>
<td>• Trust</td>
</tr>
</tbody>
</table>

**List of initiatives**

1. Informational platform
2. Supply chain visibility tool
3. WEB P.O.
4. WEB replenishment
5. WEB Shipping
6. Billing & payment
7. Technical file transfers
8. Electronic Marketplace (future initiative)
9. WEB configuration (future initiative)
web configurator constitutes an important product innovation by reducing the complexity of ordering customized products.

Second, the creation of electronic marketplaces will generate process and relational innovations for transaction preparation and completion. OEM consolidation, product complexity, short product life cycles are characteristics of the optical connectivity equipment industry that shape different but complementary e-marketplace business models. While companies will adhere to consortia-led electronic marketplaces to increase visibility and collaboration with industry partners, OEMs still want to develop their own secure private e-marketplace to facilitate vertical product development and to guarantee the confidentiality of sensitive data related to procurement practices, inventories and the sort. Finally, marketplaces may involve the participation of 3rd party service providers and may in the long run be used by suppliers to manage their own supplier base.

6. Concluding remarks

Creating a seamless interconnecting supply chain is the ultimate goal of many companies. Supply chain partnerships are rapidly becoming strategic in many industries. Competition has changed over the years as it involves not only individual companies but also entire supply chains [3,4,23]. This is evidently the case in the environment in which this study was conducted.

First, results from our analysis clearly show that business-to-business electronic commerce is merely a means to support supply chain strategies. The ultimate objective of the B-to-B initiatives is to optimize supply chain configurations by triggering visibility through collaborative and demand-driven forecasting tools.

Second, the case studies reveal that electronic commerce strengthens business relationships in the supply chain because of the important investments required from all parties to implement such collaborative practices and also because of the very strategic nature of the information that is exchanged in these closed networks.

Finally, in the telecommunication equipment industry, electronic commerce has and will continue to be driven by sectorial initiatives and private supply chain platforms. These electronic commerce platforms are more likely to rapidly reach critical masses of stakeholders and reshape industries by defining new business practices.

In the future, we hope to analyze the impacts of these planned initiatives, particularly in the context of the emergence of electronic marketplaces.

References


