



THE ROLE OF THE CONTINUOUS IMPROVEMENT TOOLS OF PROCESSES IN BUILDING RELATIONSHIPS IN SUPPLY CHAIN

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ABSTRACT. Background: The aim of this paper is to determine the importance of the quality management and environmental management systems as well as operational improvement tools (such as TPS, Six Sigma, and Lean Management) in building partnerships in supply chain.

Methods: This paper contains the results of survey in companies operating in Poland and an analysis of the requirements for suppliers in the implementation of the quality and environmental management systems elements as well as recommendation for them to implement process improvement tools (such as elements of the TPS, the concept of Lean Management and Six Sigma methodologies).

Results: The results of the survey and the analysis of the examples show that companies that are buyers in the B2B market often define the very individualized to suppliers needs through detailed specifications defining the requirements for quality assurance, performance increases, (for example, shortening implementation cycles), efficiency (cost reduction), safety, reducing the negative impact on the environment.

Conclusions: The effectiveness of the action on improving the quality of processes and products by building relationships with suppliers depends largely on the support provided to them. To achieve these objectives many companies introduce special development programs for suppliers.

Key words: continuous improvement, supply chain management, supplier relationship management, sustainable development.

INTRODUCTION

Building partner relationships in supply chain is largely the result of some kind of evolution from the repetitive transactions based on loyalty to the source of purchase and trust between partners. Recurring transactions are often transformed into long-term relationships in which mutual relations are governed by contract. If the parties are satisfied with the implementation of the provisions contained in them that such cooperation can become a close partner relationships. They can lead to many mutual benefits such as improving product quality and service, shorten order fulfillment cycles,

purchasing efficiencies, improve communication between the supplier and the recipient or joint research and development. The observation of business practice shows that many enterprises improving the processes in a supply chain focus on the implementation of quality, environmental and safety management systems conform to international standards requirements as well as operational excellence tools like Toyota Production System, Lean Management and Six Sigma methodologies. Many companies often define their suppliers individualized requirements through specifications to determine not only the issues related to quality assurance, but also organizational performance related to the increase of efficiency (cost reduction),

reducing the negative impact on the environment. Suppliers adapting to these requirements make a platform for building partnerships with business clients [Lofti, Sahran, Mukhtar, Zadeh 2013].

BUILDING RELATIONSHIPS IN THE SUPPLY CHAIN

Supply Chain Management is a fundamental concept of logistics that has evolved to enable organizations to improve their efficiency and effectiveness in the global and highly competitive environment in the twenty first century. This conception comprises processes connected with planning, completion and evaluation related to the flow of materials, equipment, information and human resources among organizations to ensure effective and fast delivery of tangible products and services between the supplier and the customer [Ballou 2004, Stonebraker 2004, Narasimhan, Matthews 2006]. Building a competitive advantage in particular is subject to shaping the long-term partner relationships between companies and their customers and suppliers. Individualized, trust-based approach towards the establishment of contacts, interests and possibilities of cooperation offer, the negotiation and execution of transactions with parties guaranteeing their equivalent positions (called win-win). Positive evaluation of these activities is essential to maintain these relationships and a sign of readiness for further cooperation partners, by which each party can see the number of measurable benefits. The condition of their feelings is effective communication in the form and content of communication should meet the expectations of each partner [Prahinski, Benton 2004, Miocevic 2008].

The activities of multinational corporations, which introduced the concept of sustainable development is heavily focused on collaboration with its partners in the supply chain (suppliers and customers). Large corporations are increasingly offering their support through joint ventures, such as deployment projects operational improvement tools (environmental and safety management systems, Lean Management, Six Sigma, TPS), or develop concepts for new products. Build

partnerships with customers and suppliers, can bring the supply chain many important benefits such as:

- Shortening the time for new products (and reducing the associated costs);
- To ensure business continuity, together with the methodology developed for the identification, analysis, and hazard mitigation (associated with the product and the processes implemented in the supply chain);
- Increased flexibility, efficiency and effectiveness of the processes through an efficient and rapid communication (aimed at forecasting demand, joint planning of resource use; use of a compatible infrastructure and the use of operational improvement tools [quality management systems / environment / safety, as well as Toyota Production System (based on Kaizen philosophy), Lean Management, and Six Sigma]);
- Promotion of ethics in economic activity, through the avoidance of corruption, discrimination (using monopolistic practices), the discharge of contracts (including trade secrets), and compliance with regulatory requirements, design and analysis of product life cycle (according to the guidelines contained in ISO standards series 14 040) [Aboelmaged 2010, Mollenkopf et al. 2010, Goebel 2012].

A partnership comprises a process in which the customer and the supplier gradually build strong and extensive social, economic and technical relations. Creating partnerships usually results from some kind of evolution beginning with repeated transactions based on loyalty to the source of purchase and on confidence related to a positive image of a particular partner. Repeated transactions often transform into long-term connections in which relations are regulated by agreements. If parties are satisfied with keeping arrangements set out in the agreements, their cooperation may transform into a close partnership [Wagner 2011]. This may produce lots of benefits for the partners and these are: improved quality of products and services, prompter carrying out of orders, preferential prices, improved communication between the supplier and the recipient (quicker and more complete exchange of information), joint

research and development [Beverland, Lindgreen 2005]. The benefits enhance positive images of partners. In some cases, a partnership between the supplier and the customer may transform into a strategic alliance which is based on joint achievement of specific long-term goals.

THE ROLE OF QUALITY AND ENVIRONMENTAL MANAGEMENT STANDARDS IN COOPERATION WITH SUPPLIERS

Building a partnership with suppliers is dependent on specifying the requirements they must meet and on the efficiency of employing tools which will make them fulfil the requirements, e.g. audits, supplier evaluation sheets (which are based on an indicator analysis concerning meeting requirements in the area of technical quality, meeting deadlines, price competitiveness, providing services). Significant conditions shaping this partnership are the speed of information exchange and individualization of approach, e.g. by means of offering a wider and wider range of services by the supplier and getting involved in joint research and development of new products. The most common organizational standard used by companies to ensure the required quality and raising its level with the growth expectations of the buyers are the guidelines contained in ISO 9001. The guidance in this standard includes criteria for the implementation of operational processes (related to product design, purchasing, production, transportation, storage and delivery of goods, installation of equipment at the customer service after the sale). The standardization of these processes is achieved through Standard Operating Procedures (SOP) and/or employee training programs, provision of resources (personnel qualifications maintenance of facilities, supervised environment), and the use of monitoring and measurement methods which allow the quality level of provided services to be reached and improved. The selection of suppliers is usually preceded by an audit. During the audit clients particularly focus on the evaluation of the capacity of the suppliers. This assessment includes the following elements: infrastructure (buildings, equipment manufacturing),

maintenance and efficiency of IT equipment. The periodic classification of suppliers is carried out through continuous monitoring and measurement using indicators relating to the quality of the products entrusted supply (no damage, theft, shortage), timeliness of delivery (no delays in deliveries), responsiveness to complaints, compliance with delivery of documents, and flexibility (the possibility of changes in the size and timing of deliveries). Performed by the customers, periodic surveillance audits at suppliers' plants include not only the verification of compliance with organizational standards requirements. Audits also provide arrangements for process improvement by reducing the level of risk, the risks associated with quality products, improving the environmental impact and exchange of information (including documents and records). Some international companies require from suppliers regular reports on progress in the improvement of management systems (Feedback Reports Cards) which contain data on cost reduction, reduction of non-compliance, improvement of efficiency and effectiveness indicator processes, reduction of energy consumption, a cutting of cycle times of processes, and optimization of capacity utilization [Zhao, Huo, Sun, Zhao 2013]. More and more enterprises, before starting collaboration with suppliers, take into account the introduction of environmental management standards based on the monitoring of environmental aspects. These standards emphasize the objectives (based on the environmental aspects) and programs to improve the impact on the environment, as well as legal compliance in this area. During the audit suppliers are assessed for compliance with the requirements of international environmental management standards ISO series 14000 and legal requirements for the protection of the environment (in particular Directives of the European Union [MacDonald 2005, Fuentes-Fuentes, Lloréns-Montes, Molina-Fernanández, Albacete-Sáez 2011, Igarashi, de Boer, Fet 2013, Wiengarten, Pagell, Fynes 2013]. Many companies also assess suppliers on the basis of their level of management focusing on the requirements of ISO 9001 and ISO 14001 standards. Many international companies publish their own holistic requirements (in the form of Supplier Quality Requirements Manuals, Supplier

Quality and Excellence Manuals, Customer-Specific Requirements) which are relevant to a wider range than those of international standards. Compliance with these requirements the clients are verified by the client through the audits and self-assessment of suppliers. Auditing suppliers and their implementation of an environmental management system is particularly noticeable in case of international concerns. During those audits particular attention is paid to:

- documents which are used (procedures and instructions), their legibility, identification and accessibility;
- recording of processes (control and use of statistical methods);
- identification of processes and products;
- work safety conditions;
- management of environmental aspects.

The criteria which may determine temporary evaluation of a supplier include: the level of technical quality which is offered, advantageous price conditions, deliveries meeting deadlines, favourable payment deadlines, having a quality system, the level of assistance, responding to complaints. Many companies also assess suppliers on the basis of their level of management focusing on the requirements conform to ISO 9001 and ISO 14001 standards. They also audit suppliers periodically. Some international companies require regular reports on progress in improvement of management systems while monitoring suppliers. They also keep monitoring them regularly by means of Supplier Performance Feedback Reports Cards which contains data on lowering costs, reducing incompatibility, improving effectiveness indicators and process efficiency indicators, reducing energy consumption, shorter cycles of process completion, and optimization of using production capabilities. The above-described behaviour may be presented as a cycle of constant improvement. Companies implementing management systems which conform to organisational standards more often complete sheets and use periodical evaluation indicators as well as audit their business partners when shaping their relations with suppliers compared to companies which do not implement systems of this type. They also require certificates which conform to the implementation of quality and

environmental management systems [Pojasek 2008, de Souse Jabbour, Jabbour, Latan, Teixeira, de Oliveira]. Creating partnerships with the suppliers transform commercial cooperation into various types of alliances and, thus, gain a range of benefits:

- time saving connected with choosing a supply source;
- reduced risk which connected with choosing a new supplier or buying a new product (brand);
- quicker and more effective flow of market information;
- joint solving of technical and (sometimes) organisational problems, which allows greater effectiveness of using resources in process enhancement.

More and more often institutional clients (especially producers) begin to concentrate on the selection of key suppliers, shaping long-term relations with them based on the advancement of the technical quality of product solutions (running research and development projects together), reliability of deliveries (based both on their flexibility and shortening of the order cycle). These actions executed by both sides lead to decreasing costs [Krause 1997, Casadesús, de Castro 2005, Mistra, Patel 2010, Arumugem, Derakhshan, Boon 2011, Garfamy 2011, Ylimäki 2014].

THE ROLE OF OPERATIONAL IMPROVEMENT TOOLS IN BUILDING RELATIONSHIPS BETWEEN PARTNERS IN THE SUPPLY CHAIN

Institutional purchasers, particularly large multinational companies, increasingly attach importance to ensure continuity flows in the supply chain (exchange of products and information) and to improve efficiency. They use this to improve efficiency and effectiveness of processes using operational improvement tools such as the elements of the Toyota Production System (which includes, Kaizen, 5S, Total Productive Maintenance), the concept of Lean Management, and Six Sigma methodologies. The implementation of these tools is often seen as a collaborative project by the partners in the supply chain. To

ensure continuity in the flow of products and information Total Productive Maintenance (TPM) is particularly important and aiming to prevent unexpected failures of infrastructure. Through the introduction of TPM one can avoid discrepancies relating to the flow of information (in case of hardware failure or a computer network), as well as products in the processes of production, storage, transport and related losses (non-compliance, failure of goods or delays in the timely performance of the contract and delivery to the buyer). Enterprises wanting to further eliminate possible losses associated with the flow of products and information decide to implement the concept of Lean Management [Konecka 2010]. This concept is often introduced by using the Six Sigma methodology. The most commonly used methodology is DMAIC (Define-Measurement-Analyze-Improve-Control), which focuses on improving existing processes and products. The second methodology is DMADV (Define-Measurement-Analyze-Design-Verify), which is used in the implementation of new processes and products. Joint implementation projects, Lean Six Sigma and Six Sigma allows supply chain partners to achieve many benefits, such as improving the technical quality of products, shortening cycles, improve efficiency of processes, increase the effectiveness of internal and external communications, as well as helps to improve safety of processes and reduce environmental negative impact [Aboelimged

2010, Jauhar, Tilasi, Choudhary 2012, Mollenkopf, Stolze, Tate, Ueltschy 2010].

RESULTS OF THE SURVEY

The subjects of the empirical studies described in this paper were to identify the roll of continuous improvement tools (as QHSE systems as well other concepts as Toyota Production System in building the relationship with suppliers and business clients. The research was carried from September till December 2013. Questionnaires were sent to 3857 operators in Poland in the form of mail survey. 170 questionnaires were successful full completed returned (the result was at 4.4% response rate). In study were used the purposeful selection of companies (manufacturing and service) located in the base ISO Guide 2012 with the implementation of quality management systems in accordance with international standard ISO 9001. In the study were used a purposeful selection of companies registered in the base ISO Guide 2012. All surveyed companies have implemented quality management systems in accordance with international standard ISO 9001. An important research problem was to determine the segments of the enterprise for which the implementation of continuous improvement tools is the importance of building relationships with partners in the supply chain The results of the survey were presented in the tables below.

Table 1. Number of surveyed companies in terms of implemented continuous improvement tools
 Tabela 1. Liczba przedsiębiorstw poddanych badaniu w zależności od wdrożonych narzędzi ciągłego doskonalenia

Segment of enterprises	ISO 9001	14001	OHSAS 18001 /PN-N 18001	TPS	Lean Management	Six Sigma
General	170	63	36	23	25	18
Producers	115	42	22	20	20	15
Service providers	55	21	14	3	5	3
SME (-250 employess)	132	39	23	12	14	9
Large companies	38	24	13	11	11	9
Enterprises with foreign capital	36	22	11	13	15	10
Enterprises with domestic capital	134	41	25	10	10	8

Source: author's research

Table 2. The role of continuous improvement tools in building relationships with clients (percentage rate; comparison of organizations general and in terms of sector, number of employees and origin of capital)
Tabela 2. Rola narzędzi ciągłego doskonalenia w budowaniu relacji z klientami (udział procentowy, porównanie pomiędzy badanymi przedsiębiorstwami ogółem i w zależności od liczby zatrudnionych pracowników oraz od pochodzenia kapitału)

Segment of enterprises	ISO 9001	14001	OHSAS 18001/PN-N 18001	TPS	Lean Management	Six Sigma
General	64.12	44.44	41.67	26.09	20.00	22.22
Producers	65.22	42.86	31.82	25.00	15.00	13.33
Service providers	61.82	47.62	57.14	33.33	40.00	67.67
SME (-250 employess)	61.36	46.15	47.82	16.66	14.29	11.11
Large companies	73.68	41.67	30.77	36.36	27.27	33.33
Enterprises with foreign capital	66.67	45.45	45.45	30.76	30.00	30.00
Enterprises with domestic capital	63.43	43.90	40.00	20.00	10.00	12.50

Source: author's research

Table 3. The role of continuous improvement tools in building relationships with suppliers (percentage rate; comparison of organizations general and in terms of sector, number of employees and origin of capital)

Tabela 3. Rola narzędzi ciągłego doskonalenia w budowaniu relacji z dostawcami (udział procentowy, porównanie pomiędzy badanymi przedsiębiorstwami ogółem i w zależności od liczby zatrudnionych pracowników oraz od pochodzenia kapitału)

Segment of enterprises	ISO 9001	14001	OHSAS 18001/PN-N 18001	TPS	Lean Management	Six Sigma
General	51.76	23.81	22.22	17.39	28.00	22.22
Producers	47.83	21.43	18.18	10.00	20.00	13.33
Service providers	60.00	28.57	28.57	66.67	60.00	67.67
SME (-250 employess)	49.24	28.20	34.78	8.33	21.43	11.11
Large companies	60.53	16.67	15.38	27.27	36.66	33.33
Enterprises with foreign capital	50.00	9.09	9.09	23.08	33.33	30.00
Enterprises with domestic capital	52.24	31.71	28.00	10.00	20.00	12.50

Source: author's research

The results of the study indicate that the use of process improvement tools in building relationships with supply chain partners are interested the service companies. One could that small and medium-sized enterprises by building relationships with customers and suppliers are focused on the implementation of environmental as well as health and safety management systems (EHSMS). On the other hand, large organizations (employing more than 250 employees) and enterprises with foreign capital by building relationships with partners attach particular importance to the implementation of process improvement tools such as concepts like Toyota Production System, Lean Management and Six Sigma. The implementation of these tools brings the partners undoubtedly many significant mutual benefits such as ensuring the quality (technical quality guarantee), increasing the effectiveness (shortening implementation cycles), efficiency

(cost reduction), security of processes, reducing the negative impact on the environment, improving the effectiveness of communication in the supply as well the implementation of join project which are focus on product and process innovations.

SUPPORTING PROGRAMS OFFERING FOR TO SUPPLIER TO ACHIEVE CONTINUOUS IMPROVEMENT TOOLS OF PROCESSES

Many international companies seeking to help local suppliers to meet their stringent requirements offer assistance in the form of consulting and training in quality management (for example "Mazda Quality Classes"), or improvement of management systems,

especially in areas related to safety and the environment (such as Alcan's Drive for Procurement Excellence, HSE). A similar initiative in establishing this program has Intel Supplier Continuous Quality Improvement (SCQI), which purpose is to assist suppliers in complying with the requirements of the quality management system, environment and safety. Activities in this field by Siemens is also implementing a program PROMEHS (Process Management for Environment, Health & Safety), and setting Assus Green ASUS (GA) - Green Supply Chain Management ASUS, focused on a set of system requirements for improving the environmental aspects of the supplier-Green Product Management System (GPMS). Bosch is trying to educate its suppliers on operational improvement tools like Six Sigma, TPS, or lean management consulting with them on joint projects within the Supplier Development Program. Similar activities also keep the air company British Aerospace, which introduced the Supply Chain Excellence Program, Hewlett Packard taking The Focused Improvement Suppliers Initiative, and LG implementing a Win-Win Partnership Program. Building relationships with customers and with suppliers is a prerequisite for improving the organization and its processes, realized not only through the requirements of quality management standards, environmental, or security management standards, but also other tools such as TPS, Six Sigma, and Lean Management [Arnheiter, Maleyeff 2005, Klefsjö, Bergquist, Garvare 2008, Praxmarer-Carus, Sucky, Durst 2013, Dou, Zhu, Sarkis 2014].

CONCLUSION

Recapitulating, it should be noted that the enterprises define customized requirements to their suppliers through detailed specifications, which determine not only the issues related to ensuring the quality (ensuring technical quality), but also related to the increase in organizational efficiency (shortening implementation cycles), efficiency (cost reduction), safety (working conditions, information management), reducing negative impact on the environment, and implementation of product and process innovations [We, Wu 2009, Wiengarten, Pagell

2012]. This approach is an important incentive for companies to improve the management system by introducing environmental and safety organizational standards, as well as other excellence tools that require more active involvement of employees in order to improve the performance of operational processes. The actions taken by the company in the field of continuous improvement has a significant impact ongoing globalization. International expansion of many companies, especially global companies increases the importance of technical standardization (to ensure consistent quality required), and organization standardization. This is particularly important in countries where investments are located due to lower labor costs like Central and Eastern Europe and Asia. In these countries, one could perceive a gap in the field of organizational solutions between international corporations and indigenous businesses. In many cases this gap is outweighed by the introduction of the concept of sustainable development. International companies which implement this concept focus on cooperation with their partners in the supply chain (suppliers and customers), offering them support through joint projects. These initiatives are aimed at improving common processes and developing concepts for new products. For many companies, relationships with suppliers are not limited to putting their stringent requirements and continuous improvement on sustain development [Huq, Stevenson, Zorzini, 2014, Fabbe-Costes, Rousst, Taylor, Taylor 2014]. It is increasingly being recognized that the creation of competitive advantage requires the companies to build relationships with suppliers, which manifests itself in joint projects. These projects focus on implementation of product innovations (improving the technical parameters of existing and implementation of a completely new product), and contribute to improvement of organizational performance as well as process efficiency through reducing costs by increasing employee productivity, infrastructure capacity, and eliminate wastes.

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ROLA CIĄGŁEGO DOSKONALENIA NARZĘDZI BUDOWANIA RELACJI W ŁAŃCUCHU DOSTAW

STRESZCZENIE. Wstęp: Celem artykułu jest określenie znaczenia systemowego zarządzania jakością oraz środowiskiem, a także narzędzi doskonalenia operacyjnego (takich jak TPS, Six Sigma, czy Lean Management) w budowaniu partnerskich relacji w łańcuchu dostaw.

Metody: W artykule przeanalizowano wyniki badań ankietowych oraz wymagania stawiane dostawcom w zakresie wdrażania elementów systemowego zarządzania jakością oraz środowiskiem, a także zalecenia stawiane im w zakresie wdrażania narzędzi doskonalenia procesów (takich jak elementy TPS, koncepcja Lean Management, czy metodyki Six Sigma).

Wyniki: Przedstawione wyniki badań ankietowych przedsiębiorstw działających w Polsce analiz na zaprezentowanych przykładach wskazują, iż przedsiębiorstwa definiują wobec dostawców często bardzo zindywidualizowane oczekiwania poprzez szczegółowe specyfikacje określające wymagania dotyczące zapewnienie jakości, podwyższaniem sprawności (np. skracanie cykli realizacji), efektywności (obniżaniem kosztów), bezpieczeństwa, zmniejszania uciążliwości dla środowiska.

Wnioski: Na skuteczność podejmowanych działań w zakresie doskonalenia jakości procesów i produktów poprzez budowanie relacji z dostawcami zależy w dużej mierze od udzielonego im wsparcia. W tym celu wiele przedsiębiorstw będących nabywcami wprowadza specjalne programy rozwoju dostawców.

Słowa kluczowe: relacje z dostawcami, systemowe zarządzanie jakością i środowiskiem, narzędzia doskonalenia operacyjnego procesów, TPS, Lean Management, Six Sigma.

ROLLE EINER STÄNDIGEN VERVOLLKOMMUNG VON VERBESSERUNGS-TOOLS FÜR DEN AUFBAU VON ZUSAMMENHÄNGEN INNERHALB EINER LIEFERKETTE

ZUSAMMENFASSUNG. Einleitung: Das Ziel dieses Artikels ist es, die Bedeutung der Qualitäts- und Umweltmanagementsysteme sowie operative Verbesserungs-Tools (wie TPS, Six Sigma und Lean Management) beim Aufbau von partnerschaftlichen Beziehungen innerhalb einer Lieferkette zu ermitteln.

Methoden: Dieser Artikel enthält eine Analyse der Anforderungen an Lieferanten bei der Umsetzung von Elementen der Qualitäts- und Umweltmanagementsysteme, sowie Empfehlungen für sie, wie man die Prozessverbesserungs-Tools (z. B. Elemente der TPS, das Konzept des Lean Managements bzw. die Six Sigma-Methodik) implementieren soll.

Ergebnisse: Die dargestellten Ergebnisse der Analyse zeigen an präsentierten Beispielen, dass die Unternehmen, die Käufer auf dem B2B-Markt sind, oft sehr individualisierte Erwartungen gegenüber Lieferanten definieren und zwar durch detaillierte Spezifikationen der Anforderungen in Bezug auf die Qualitätssicherung, Leistungssteigerung, (z.B. Verkürzung von Umsetzungszyklen), Effizienz (Kostensenkung), Sicherheit, Reduzierung negativer Auswirkungen auf die Umwelt.

Schlussfolgerungen: Die Wirksamkeit der Maßnahmen zur Verbesserung der Qualität von Prozessen und Produkten durch den Aufbau von Beziehungen mit Lieferanten hängt weitgehend von der Unterstützung ab, die ihnen geleistet wird. Um diese Ziele zu erreichen, leiten viele Unternehmen spezielle Entwicklungsprogramme für die Lieferanten ein..

Codewörter: Beziehungen mit Lieferanten, Qualitäts- und Umweltmanagementsysteme, Werkzeuge der operativen Prozessverbesserung, TPS, Lean Management, Six Sigma.

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