

## Lesiones, enfermedades y accidentes de trabajo de los conductores del autotransporte de carga en México

### Injuries, diseases and occupational accidents of cargo drivers in Mexico

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#### Palabras Clave:

Conductores de camiones; enfermedades profesionales; heridas y traumatismos; accidentes de tránsito; riesgos de trabajo.

#### Keywords:

Truck driver; occupational diseases; traffic accidents; wounds and injuries; occupational risks.

## RESUMEN

Se realizó un análisis descriptivo de tres fuentes de información con datos sobre accidentes de tránsito, lesiones de causa externa y enfermedades ocupacionales ocurridas durante el periodo 2011-2015 a los conductores del autotransporte de carga de México. Se encontró que los trabajadores del tránsito terrestre tienen mayor riesgo de muerte por accidentes (*Rate Ratio* [RR] = 4.84, Intervalos de Confianza [IC] 95% [4.48, 5.23]) y por enfermedades laborales (RR = 1.53, IC 95% [1.46, 1.61]), que el total de trabajadores en México. Las principales causas de invalidez en los conductores de vehículos pesados se relaciona con desórdenes musculoesqueléticos o reconocen la obesidad como uno de sus factores de riesgo (14% y 40%, respectivamente), además de que los vehículos de mayor tamaño son los que tienen el mayor riesgo de muerte por accidentes de tránsito (RR = 3.42, IC 95% [3.19, 3.65]). Por lo que conducir vehículos de carga es una de las actividades más peligrosas en cuanto a padecimientos y factores de riesgos asociados a su ocupación.

## ABSTRACT

A descriptive analysis was conducted using three secondary sources of information in national official records: road accidents, externally caused injuries and occupational diseases. Data used corresponded to cargo drivers in Mexico from 2011 to 2015. Results show that road drivers have a higher risk of death by accident (*Rate Ratio* [RR] = 4.84, 95% Confidence Intervals [CI 4.48, 5.23]) and occupational diseases (RR = 1.53, 95% CI [1.46, 1.61]) than average Mexican workers. The main causes of disability in heavy cargo drivers are related to musculoskeletal disorders, or they acknowledge obesity as a risk factor (14% and 40% respectively). Heavy cargo vehicles also have the highest risk of death by collision (RR = 3.42, 95% CI [3.19, 3.65]). Driving cargo vehicles is one of the most dangerous activities in terms of work-related diseases and risk factors.

## Implementation of inventory levels for raw material at herramientas Stanley

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### Abstract

Inventory management is a vital task within the supply chain. Most companies seek high inventory turnover as this could indicate effectively pulling in product sales. This project is focused on establishing efficient inventory levels and main-taining the company's competitiveness within the market. Herramientas Stanley (HS) manufactures demolition tools. Due to fluctuation in customer demand and lack of knowledge regarding inventory management, HS's inventory levels for raw material are \$2.5M USD monthly when target is \$1.85M USD, generating excess and obsolete inventory and losing the opportunity of working capital. In addition, the company does not currently have a standardized procurement pro-cess. For this project, 245 finished goods were classified, selecting 31 finished goods from a stratified sample. Finished goods were further broken down into 255 components to apply forecasts, Material Requirements Planning (MRP) and an Inventory Management System. After this analysis, logistics costs were re-duced by \$ 1 M USD annually and forecasts were improved by 21%.

### ABC Classification, Forecast, Inventory Management System, Liquidation Rate, MRP

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## **Entregas tardías o incorrectas en el autotransporte de carga y su relación con las condiciones laborales de los choferes: Un modelo de regresión logística**

### **Late or inaccurate road freight deliveries and their relationship to working conditions of drivers: A model of logistic regression**

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**Palabras Clave:** autotransporte de carga; cadena de suministro; condiciones laborales de los conductores; regresión logística; entregas a tiempo

**Keywords:** driver trucking; supply chain; working conditions; logistic regression binary; on-time delivery

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#### **Resumen**

**Introducción:** Los conductores del autotransporte de carga son un factor clave para satisfacer la eficiencia y la competitividad de las cadenas de suministro, por lo que están sometidos a exigencias que propician fuertes presiones derivadas de sus condiciones de trabajo. Sin embargo, no se tiene claramente identificado en qué medida sus condiciones laborales afectan la eficiencia de sus actividades. Este trabajo busca identificar en qué medida las condiciones laborales de los conductores influyen en el incumplimiento de las entregas a tiempo y, por lo tanto, repercuten en la competitividad de las cadenas de suministro.

**Método:** Se analizaron datos relacionados a 26,312 embarques que, en dos años, realizó una empresa de manufactura, que domina 80% de las ventas del mercado de sistemas de construcción ligera en México y que, por causas atribuidas al transportista, fueron calificados como entrega correcta o incorrecta. Debido a la naturaleza binaria de esta variable, se aplicó una regresión logística a los datos relacionados con el cumplimiento de embarques, para examinar la contribución de las condiciones laborales a los incumplimientos en las entregas a tiempo.

**Resultados:** El modelo generado a través de la regresión logística ofrece una precisión global de la muestra de 96.3% en la predicción del evento de incumplimiento de entrega en los embarques. De once variables independientes obtenidas de los embarques realizados, cinco -la insatisfacción, el nivel de estrés, el tiempo de tránsito, el tipo de vehículo y el tener seguridad social- se encontraron significativamente asociadas con el incumplimiento en las entregas a tiempo.

**Discusión o Conclusión:** Los resultados muestran una herramienta prometedora para proporcionar interpretaciones significativas que pueden utilizarse para futuras mejoras en el

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# MODEL PROPOSAL FOR SYNCHRONIZATION AND LOGISTICS INTEGRATION OF THE SUPPLY CHAIN

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## ABSTRACT

*Nowadays, the customer orientation of the supply chain is a need presented by companies that want to generate competitive advantages in the market in which they participate. Customer orientation is possible when led and motivated by market research, the participants of a supply chain handle to create compatible philosophies, synchronize their processes and exchange sensitive information regarding levels of inventories and demand. Likewise, when participants meet to jointly plan the creation of an offer of products and services designed to satisfy the wishes, needs and purchasing expectations of customers, the bases of a future logistic integration are established. This article proposes a model of synchronization and logistical integration of the supply chain focused on the client which was generated through an exhaustive literature review and that serves as a guide in the optimal integration of the member companies of a supply chain.*

**KEYWORDS:** Supply Chain, Logistics Integration, Marketing, Strategic Alliance, Competitive Advantage

## INTRODUCTION

The strategic alliances and the buyer-seller society relationship have become more common; there is more dialogue between business partners as management realizes about the importance of sharing information and working together to jointly plan and execute strategic initiatives aimed to achieve improvements in given services. Staude (1987) wrote about the need for two types of organizational integration: interdepartmental and intradepartmental. A systemic approach requires that the objectives of the company seen as a whole be considered more important than the objectives of the individual departments, a myopic perspective focused internally can be risky. Consumers have become increasingly demanding and look for more specialized services, then the market environment is continuously changing, and demand fluctuates each day, it is, therefore, the operation of logistics processes must be more efficient (Kovacs & Kot, 2016). An efficient logistics process leads to reduce costs associated with redundancy and duplication, compress the uncertainty that arises from changes in client's orders, volatility of demand and fluctuations in delivery time. To reach optimal levels of integration dramatic changes in the way of thinking and acting are required. Generating support to change the logistics practices of a traditional supply chain requires substantial justification. Unfortunately, there is a lack of empirical evidence to support the link between integrated logistics processes and the creation of value in the supply chain.

Graham & Zailani (2005) define logistics as, "An approach of the distribution mission of a company, which integrate two or more of the functions involved in moving goods from one resource to another considering them as an interrelated system or subsystem. Which link the purposes of management planning, implementation, and control, including in this dynamic all the stakeholders: from suppliers to customers counting the entire value chain system ". Today, manufacturers and their partners in the supply chain, strive to co-create higher value for the customer and a collaboration advantage through the adoption of supply chain management (Hee-Yong Lee et al., 2016). The successful management of integrated logistics unites

# Modelo de gestión logística para pequeñas y medianas empresas en México

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## Resumen

La apertura de los mercados y la globalización de las cadenas de suministro demandan cambios estructurales en los que la logística juega un papel estratégico. Actualmente, los clientes evalúan la calidad del producto, el valor agregado del mismo y su disponibilidad en tiempo y forma, de ahí la necesidad de hacer eficientes los procesos. Diversos expertos han propuesto modelos de gestión logística para elevar la competitividad en el mercado; algunos de ellos son ambiciosos para las pequeñas y medianas empresas (Pyme) debido a la estructura informal y carencia de conocimientos técnicos de las mismas; otros hacen referencia indirecta a los flujos de información interna, implicando una desintegración total del sistema por la débil interrelación entre áreas. La Pyme en México representa el 4.2% de las empresas, genera el 31.5% del empleo y aporta el 37% del Producto Interno Bruto; de ahí surge la importancia de fortalecer su posición competitiva en el mercado. Esta investigación presenta el diseño de un modelo conceptual de gestión logística para Pyme que podría dar solución integral a través del control de las variables involucradas en los procesos logísticos; para verificar que las variables consideradas en cada dimensión identificada son las correctas se utilizó el análisis factorial.

Palabras clave: modelos de gestión logística, Pyme, competitividad, cadena de suministro, análisis factorial

## Proposal of a Model of Strategic Alliances to Strengthen Microenterprises

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### Abstract

*Mexican microenterprises face a complex world, submitted to variable and changing environments. The new international and national markets have increased competition and disrupted microenterprises, affecting their future or their existence. It is important that micro-entrepreneurs make adjustments based on new strategic alternatives that help to promote their development, competitiveness and survival, and thus who achieve their improvement. That is why there is a concern to carry out a conceptual model of strategic alliances between microenterprises, to guide those interested in its implementation. With the proposed model, the aim is to strengthen microenterprises to participate in a more active way in the new globalized market, with new skills, resources and more competitive capabilities, in order to achieve those goals that individually are complex to get. The strategic alliances nowadays have become fundamental to achieve the success that the companies are looking for.*

**Keywords:** Strategic alliances, MSMEs, alliances model.

### 1. Introduction

Companies are the engine of a country's economic development and they are great creators of wealth. They rely on their own abilities to create new knowledge and maintain competitive advantage, it does not matter how high the risk may be (Jiang et al., 2016). In today's competitive environment, which is rapidly changing and highly uncertain, companies require tools such as: qualified human capital, technology, finance and specific assets to run the organization, regardless of size, activity, age or type of company. It is necessary that companies solve their basic needs to remain in the market and achieve better growth by addressing changes required by a globalized world. (Huang and Roig, 2016).

When MSMEs are discussed it is referred to micro, small and medium-sized enterprises. MSMEs play a transcendental role in growth and development of economies. The Ministry of Economy (SE, 2014) and the Official Gazette of the Federation (DOF, 2013) indicate the percentage of these companies is 99.8percent in economic units, that they contribute 34.7percent in GDP(Gross Domestic Product)and also 73.8 percent of job generation.

Article

# Reverse Logistic Strategy for the Management of Tire Waste in Mexico and Russia: Review and Conceptual Model

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**Abstract:** Management of tire waste is an important aspect of sustainable development due to its environmental, economical and social impacts. Key aspects of Reverse Logistics (RL) and Green Logistics (GL), such as recycling, re-manufacturing and reusable packaging, can improve the management of tire waste and support sustainability. Although these processes have been performed with a high degree of efficiency in other countries such as Japan, Spain and Germany, the application in Mexico and Russia has faced setbacks due to the absence of guidelines regarding legislation, RL processes, and social responsibility. Within this context, the present work aims to develop an integrated RL model to improve on these processes by considering the RL models from Russia and Mexico. For this, a review focused on RL in Mexico, Russia, Japan and the European Union (EU) was performed. Hence, the integrated model considers regulations and policies performed in each country to assign responsibilities regarding RL processes for the management of tire waste. As discussed, the implementation of efficient RL processes for the management of tire waste depends of different social entities such as the user (customer), private and public companies, and manufacturing and state-of-the-art approaches to transform waste into different products (diversification) to consider the RL scheme as a total economic system.

**Keywords:** tire waste management; reverse logistics; green logistics; Mexico; Russia

## 1. Introduction






Logistics is defined as the element of the supply chain process that plans, implements and controls the efficient and effective flow and storage of goods, services and related information from the point of origin to the point of consumption to meet the needs of the client [1,2]. In recent years, Logistics has grown in complexity by opening its doors to a greater number of factors such as society, economics, social responsibility, sustainability and the environment. In this regard, concerns about environmental care have become an important factor, not only for the business sector, but also for society, government and social organizations.

This has paved the way for the concept of Green Logistics and Reverse Logistics:

- Reverse Logistics (RL) encompasses all the logistic activities from used products which are no longer required by the users to products again usable in a market. Within the environmental



# Risk analysis of the supply chain of a tools manufacturer in Puebla, Mexico

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## Abstract

Risk management has taken considerable importance in the supply chain. Much research has been focused on this area to improve quality and competitiveness within organisations. This paper is focused on the identification, analysis, and evaluation of risks associated to materials/purchasing departments through the failure mode and effect analysis (FMEA) and analytic hierarchy process (AHP). This integrated analysis led to prioritise the potential risks that generate downtime and financial impact of the supply chain. Having a unique supply source was identified as the main risk, and restriction on the contract's length was determined to be a suitable solving approach. The identified risks should also be quantified considering the negative effects on cost, time, and quality-functionality to provide immediate or long-term solutions.

## KEYWORDS

FMEA, purchasing risk, supply chain

## 1 | INTRODUCTION

Supply chain risks management has been a topic of interest for many companies and researchers. For example, Thun and Hoenig (2011) analysed the risks of the automotive industry, whereas Johnson (2001) did it on the toy industry.

Blos, Quaddus, Wee, and Watanabe (2009) analysed the risks of the electronic-automotive industry in Brazil, and a couple of years later, Diabat, Govindan, and Panicker (2012) developed a model to analyse the risks of the food industry. Finally, Hoa, Zheng, Yildiz, and Talluri (2015) talked about the different type of tools that have been used to mitigate the impact when there is uncertainty within the system. The risks are extensive, from missing data in an information system to natural disasters which can interrupt the production of the organisation. Supply chain risks may result from unexpected variations in capacity constraints, or from breakdowns, quality problems, fires, or even natural disasters at the suppliers (Blackhurst, Craighead, Elkins, & Handfield, 2005; Yang & Yang, 2010). These risks are associated with negative consequences regarding physical damage, pollution, or affectation in the manufacturing process

performance (Ghadge, Fang, Dani, & Antony, 2017). Regarding any probability, risks always represent a potential problem (Hoa et al., 2015).

Commercial processes within the organisations are essential to maintain a competitive advantage in the market; any failure can impact the performance of the company (Zsidisin, Panelli, & Upton, 2000). Within this context, the present work considers the failure mode and effects analysis (FMEA) to identify and assess potential risks in the materials department of a tool manufacturer located in the City of Puebla, Mexico. The studied areas were the following:

1. Purchasing. Direct and indirect material
  - a Suppliers
  - b Processes
2. Logistics and International Commerce
  - a Suppliers
  - b Processes
3. Consumer Service
  - a Internal System Failures
  - b Lack of Communication



## CADENA DE SUMINISTRO EN e-BUSINESS

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**Resumen**— El objetivo de este trabajo está enfocado a la elaboración de una Revisión Literaria de los procesos de *e-Business*, *e-Manufacturing*, *e-Commerce*, y *e-Procurement*, vinculados a *e-Supply Chain Management (e-SCM)* término referente a la cadena de suministro en el contexto e-Business o cadena de suministros electrónica, analizando el impacto de los sistemas digitales en el proceso de las compañías e identificando futuras investigaciones, marcando con esto tendencia para los profesionales y académicos interesados en este tema. Este estudio revisa 59 artículos indizados publicados en bases de datos, todos en idioma inglés, con el objeto de recolectar, analizar y encontrar áreas de oportunidad en el conocimiento de e-SCM. De nuestra selección de artículos, el 63% abordan el tema cualitativamente y el 37% utilizan algún método cuantitativo. Como resultado del análisis se sugiere enfocar nuevos trabajos de investigación en *e-SCM* aplicando Investigación de Operaciones (IO) y Teoría de Juegos, como cimientos para el posicionamiento estratégico, establecimiento de políticas y toma de decisiones de las empresas.

**Palabras clave**— e-SCM, e-Business, Estudio, Investigaciones recomendadas.

### Introducción

Este artículo está orientado a la revisión de literatura disponible en varias bases de datos para entender la evolución de la cadena de suministro en la era digital, explorando métodos aplicados en diversas áreas dando paso a la innovación en las empresas y contribuyendo al mejor desempeño de la cadena de suministro. Los cambios tecnológicos particularmente la caída en los costos de la comunicación ha permitido cambios en coordinación entre los miembros de la cadena de suministro. En este artículo analizaremos la relación que existe entre los diferentes procesos de *e-Business*: *e-SCM*, *e-Manufacturing*, *e-Procurement*, *e-Commerce*, *e-Integration*.

Se revisó la literatura de 59 artículos disponibles en varias bases de datos internacionales como Redalyc, Dialnet, Proquest, Science Research, Google Scholar, etc, todos en idioma inglés que van del año 2001 a 2016, con las palabras clave: *e-SCM*, *e-Procurement*, *e-Business*, *e-Manufacturing*, y *e-Commerce*, con el objeto de recolectar, analizar y encontrar áreas ya trabajadas y áreas de oportunidad para aportar nuevo conocimiento en e-SCM; los artículos se clasificaron por proceso: *e-Business*, *e-Commerce*, *e-Manufacturing*, *e-Procurement*, y *e-SCM*.

Se otorga especial atención a los artículos que explican métodos cuantitativos para la toma de decisiones, entre ellos están los que aplican Investigación de Operaciones, Teoría de juegos, Algoritmos de Lógica Difusa, Metaheurísticas como Colonia de hormigas, Redes de Petri, etc, basado en estos resultados se sugieren nuevas investigaciones para la mejora de e-SCM.

Para entender el desarrollo de la gestión de la cadena de suministro haremos una breve revisión de su evolución hasta lo que hoy conocemos como e-SCM.

### Revisión Literaria

*e-Business* surge al inicio de los años 90's y ha agregado velocidad a todo lo que hacemos en la industria impactando procesos de negocios como: Adquisiciones, Gestión de Cadena de Suministro, Gestión de relación con el cliente y Planeación de recursos de la empresa.

Existe una confusión considerable en la literatura concerniente a las varias terminologías usadas para describir e-Business, considerando como adecuada la siguiente: “e-Business: es un enfoque para lograr las metas de negocios en la cual la tecnología de la información intercambia, permite y facilita la ejecución de actividades en y a través de la

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# CONCEPTUAL MODEL FOR THE INTEGRATION OF THE SUPPLY CHAIN

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## ABSTRACT

*A customer orientation of the supply chain is need for companies that want to generate competitive advantages in the market. Customer orientation is possible when motivated by market research. The participants of a supply chain create compatible philosophies, synchronize their processes and exchange sensitive information regarding levels of inventories and demand. Likewise, when participants meet to jointly plan the creation of an offer of products and services designed to satisfy the wishes, needs and purchasing expectations of customers, the bases of a future logistic integration are established. This work proposes a conceptual model for the integration of the supply chain focused on the client. This article was generated through an exhaustive literature review and serves as a guide for the optimal integration of the members of a supply chain.*

**JEL:** O30, N7

**KEYWORDS:** Supply Chain, Logistics Integration, Strategic Alliance, Competitive Advantage

## INTRODUCTION

Strategic alliances and the buyer-seller society relationship have become more common. There is increased dialogue between business partners as management realizes the importance of sharing information and working together to jointly plan and execute strategic initiatives aimed to achieve improvements in given services. Staude (1987) wrote about the need for two types of organizational integration: interdepartmental and intradepartmental. A systemic approach requires that the objectives of the company, seen as a whole, be considered more important than the objectives of individual departments. A myopic perspective focused internally can be risky. For decades it has been recognized that satisfaction of needs and fulfillment of client demands must be the central objective of those that make up the supply chain. Many of the most progressive and successful firms emphasize the logistics service as a competitive differentiator in this area (Livingstone, 1992 y Stern, Sturdivant, & A., 1993).

Consumers have become increasingly demanding and look for more specialized services. The market environment is continuously changing to accommodate these consumer desires, and demand fluctuates each day. Therefore, the operation of logistics processes must be more efficient (Kovacs & Kot, 2016). For this reason, we consider the logistical integration of supply chain activities. These activities include participating entities such as suppliers, manufacturers, transporters, stockists, customs brokers, freight forwarders, shipping companies, airlines, railways, commercial brokers and points of sales to the consumer. The goals is to create value within the market of participation.

An efficient logistics process leads to reduce costs associated with redundancy and duplication. It compresses uncertainty that arises from changes in client's orders, volatility of demand and fluctuations in

# ESTRATEGIA DE MEJORA CONTINUA PARA AGILIZAR LA GESTION ADMINISTRATIVA DE LA TRANSPORTACION DE RESIDUOS PELIGROSOS DE LA EMPRESA PROAMBIENTAL

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## RESUMEN

*Actualmente el proceso de recolección de residuos es un problema, el cual reclama atención para poder realizar de manera eficiente el mismo dentro de la empresa mexicana Proambiental. La empresa tiene 30 recolecciones por semana, de las cuales tiene un nivel de servicio promedio del 70 % en cuanto a las entregas puntuales, si hablamos del gasto mensual de combustible su promedio esta en 75 mil pesos, teniendo un promedio de 38 incidencias en el departamento de logística reportada por sus clientes. Este artículo está basado en la aplicación de la metodología basada en PDCA el cual significa (Plan, Do, Check, Act en el círculo de Deming apoyada de herramienta del Kaizen y 5s) del cual uno de los objetivos es el incrementar el porcentaje de cumplimiento de sus recolecciones en tiempo, la meta fue incrementar un 10 % el nivel para alcanzar un 80 % en promedio, es decir subió el promedio de recolecciones en tiempo de un 70% a un 80%. Las incidencias decrecieron de 38 a 26 en promedio como resultado de las implementaciones de controles. De la misma manera se disminuyó un 5 % el gasto de combustible que equivale a \$70 000 mil pesos en promedio mensual.*

**JEL:** C10, C49, L90, J20

**PALABRAS CLAVES:** PDCA, KAIZEN, 5' S, SIPOC, Pareto, Ishikawa, AMEF

## STRATEGY OF CONTINUOUS IMPROVEMENT TO STREAMLINE MANAGEMENT OF TRANSPORTATION OF HAZARDOUS WASTE

### ABSTRACT

*Currently, waste collection is a big issue worldwide; therefore, the Mexican company Proambiental is committed to improving its processes. The company has 30 waste collection services a week with an average of 70% of on time services, which results in \$75 thousand pesos fuel expenses and 38 incidences reported by the logistics department. This paper describes the use of a new methodology based on PDCA (Plan, Do, Check, Act in the Deming circle supported by the Kaizen and 5s tool) whose main objective was to increase in 10% the on time collection services, which actually went from 70 to 80%. After the intervention, the incidences decreased from 38 to 26; in addition, there was a reduction of 5% in the monthly fuel expenses going from \$75 to \$70 thousand pesos.*

**KEY WORDS:** PDCA, KAIZEN, 5's, SIPOC, Pareto, Ishikawa, AMEF.

# FLUJOS E INTEGRACIÓN DE INFORMACIÓN EN LA CADENA DE SUMINISTRO AUTOMOTRIZ

## FLOW AND INTEGRATION OF INFORMATION IN THE AUTOMOTIVE SUPPLY CHAIN

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### ABSTRACT

*El propósito de este documento es enfatizar la correlación positiva que debe existir en el intercambio de flujo de información dentro de la cadena de suministro. Se presenta información de una empresa de la industria automotriz y los costos extras en los que ha incurrido, como fletes extraordinarios y paros de línea, causados por falta de información oportuna para la toma de decisiones de abastecimiento de materia prima. El documento también muestra información del flujo de información requerido para requerimientos de materia prima, pero por falta de integración de información y aplicación de los procedimientos no se cumple el objetivo de abastecimiento de materiales.*

**PALABRAS CLAVE :** Cadena de Suministro, Flujo de Información, Logística, Integración.

### ABSTRACT

*The purpose of this document is to emphasize the positive correlation that must exist in the exchange of information flow within the supply chain. It presents information about a company in the automotive industry and the extra costs it has incurred, such as extraordinary freights and line interruptions, due to lack of timely information to make decisions on the supply of raw materials. The document also shows information on the flow of information required for raw material requirements, but due to lack of information, integration and application of the procedures, the objective of supplying materials is not met.*

**KEY WORDS.** Supply Chain, Information Flow, Logistics, Integration

### INTRODUCCIÓN

La industria automotriz está sujeta a ser una de las más ágiles alrededor del mundo, el cambio es constante y no tiene señales de detenerse, dentro de esta industria el intercambio de información también es continuo y global, por lo que el mantener información continuamente actualizada y en tiempo real es de vital importancia para la supervivencia en esta industria y para poder obtener una ventaja competitiva. El presente trabajo muestra información de una empresa dentro de la industria automotriz catalogada como la empresa número uno alrededor del mundo en la fabricación de asientos automotrices, la cual actualmente está enfrentando dificultades en el abastecimiento de materia prima para poder cumplir con los requerimientos de sus clientes debido a la falta de información verídica lo que está orillando a la toma de decisiones inadecuadas.

### REVISIÓN DE LITERATURE

La industria manufacturera es fundamental para elevar la competitividad de los países, pero la intensa competencia ha cambiado drásticamente la forma en que las empresas operan sus sistemas de producción