PREDICTIVE ANALYTICS FOR TRANSPORTATION INDUSTRY

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ABSTRACT

The movement of goods from one point to another is complex - the transportation industry is a blend of the networks, infrastructure, equipment, information technology, and employee's necessary to transport a large variety of products safely and efficiently throughout the nation and around the world. Although generally considered separate transportation entities, trains, planes, ships and trucks are actually part of an integrated network. One of the defining characteristics of today's transportation industry is intermodal or logistic services, the movement of freight through a coordinated and nearly seamless system that uses multiple modes of transportation. Many products now move worldwide in standardized containers that easily transfer onto truck chassis, rail cars, and ship decks as they move from origin to destination. Also, the paper presents the role and importance of products logistics and services in order to obtain the competitive advantage. After a short presentation of logistics evolution, we will define the logistics concept, respectively integrated logistics. The analysis of the logistics activities is based on the total cost concept and it has as a purpose the efficient and effective management of the physical flows of raw materials, materials and finite products, and of the international flows. The competitive advantage is ensured through the harmonization of the logistics function with the other company functions and through the integration of the logistics chain of all upstream and downstream organizations in order to ensure a high level of consumer service at economical costs under the farm of supply chain management. In the end we present the main tendencies in the logistics evolution in the Romanian firms under the circumstances that their international dimension increases.

KEYWORDS: *transportation industry, intermodal, information technology, logistics, supply chain, supply chain management, predictive analytics*

1. INTRODUCTION

Technology plays an important role in the transportation industry, allowing companies to respond to evolving requirements to move an ever-increasing number of products. Technological enhancements are transforming the operation and management of the transportation system in revolutionary ways [1].

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Companies are trying to optimize their transportation systems to better forecast demand and analyze all the competing resources such as workforce, routes, cost, transport mode, equipment and demand all while gaining more efficiency from its operations.

With the rapid growth and demand in the transportation industry, companies are struggling to efficiently transport materials and utilize their employees while reducing the risk of turnover.

1.1. Customer Pain Points

Optimizing routes [2] and workforce utilization pose significant challenges:

- Globalization and the changing economy are placing greater demand on the transportation system to *move shipments faster and cheaper.*
  - The most critical aspect of the transportation infrastructure problem is *congestion or capacity constraint.* Motor vehicle overcrowding is a major problem in the largest cities. The shortest route often isn't the fastest.
  - Companies are *collecting more data than ever* from gps, bar-coding, RFID, time stamping, etc. While more data can give companies more information, it also makes *decision making more complicated.*
  - *Accurately forecasting demand* challenges companies - not really knowing what is coming, when and who needs it when, can tie up resources.
- There is *tremendous cost in recruiting and training employees*. Keeping full crews for the trucks, trains, ships, and planes challenges even the best organizations in the industry.
  - Companies can't pay their employees enough to live on the road - they need a compensation package that enables employees to balance their personal and professional needs.

The need to optimize routes and workforce utilization is becoming even more crucial with fluctuating fuel costs. Even with the ability to pass some of the fuel costs along to customers via fuel clause adjustment, companies are experiencing shrinking profit margins and capacity constraints in terms of both physical and human capital.

1.2. Conversation Starters

The challenges associated with forecasting and optimizing delivery routes and workforce utilization can significantly impact a company's bottom line [3]. We've been able to identify and solve a variety of issues by:

- Accurately forecasting demand and planning to optimize resource allocation;
- Conducting impact analysis of changes in the plan;
- Developing an operating plan that is tightly matched to traffic patterns;
- Enabling shortest-path-based algorithms using a large number of applicable factors;
- Providing resource retention scenarios and plans.

With these data mining, operational forecasting and research practices in place, transportation companies are able to optimize their daily operations thereby reducing costs and increasing revenue growth potential.

Table 1. Questions to determine the issues of the transport company

Optimizing routes	*Workforce utilization*
How do you determine the best method of transport?	Is your transportation demand affected by seasonality? What are your busiest months and how do you plan for workforce shifts?
How do you currently determine the best route for a shipment/delivery?	How much does it cost to recruit and train new employees?
What are your experiences in meeting customer Service Level Agreement regarding on-time deliveries?	How long does it take to train an employee?
At what frequency, if at all, are you incurring significant refunds to customers because of late deliveries?	What is your turnover rate by employee classification or role?
What processes can you attribute to any lost business due to poor delivery times?	How do you retain your best engineers, drivers, pilots, or captains?
What factors do you consider when determining the most efficient route?	Do you know the peaks and valleys of when an employee may consider leaving and what to do to keep them?
Do you know which customers, business segments or routes are most profitable?	Do you know the peaks and valleys of when an employee may consider leaving and what to do to keep them?
How do you allocate your resources? Do you use a forecast or demand planning application?	Do you know what your applicable factors are? Who are your best employees and what makes them the best?
Is your network constrained? Is demand exceeding capacity?	
How do you adjust for seasonal and climate variations by location?	
How do you get information to and from the drivers and integrate the data into systems to identify trends for the next time this route, season, event, etc. occurs?	
With the volatile fuel prices, at what point do you start passing on the increased cost to your customers?	

1.3. Solutions

The key to transport operations and workforce utilization *understands all of the variables* such as weather, season, and mode of transportation, employee experience, workforce utilization, traffic patterns, and levels of congestion or network constraint, size of load,

fuel prices and more [3]. With all the variables in play when developing your shipping plans, you will uncover the most beneficial options.

Analytics decision makers no longer have to rely on intuition. These analytics capabilities give you the power to make decisions and build productive protocols based on:

- acts using your data and industry models;
- thorough forecasting;
- simultaneous consideration of all options;
- simulation and *"what if"* analysis;
- careful predictions of outcomes and estimates of risk;
- State-of-the-art decision tools and algorithmic engines.

Analytics offer significant value to transportation companies by providing capabilities to better allocate resources, adapt to changes in cost, demand, traffic patterns, weather, employee turnover and satisfaction and economic conditions.

Companies using the analytics software will benefit improving performance, maximizing the workforce, optimizing routes, boosting retention rates, thus resulting in improved profit margins and top line revenue growth.

2. e-LOGISTICS – MULTIMODAL TRANSPORT MANAGEMENT

2.1. Definition and concept of development logistics

United Nations Convention relating to multimodal transport of goods adopted in Geneva year 1980 (Multimodal Transport Convention) defines multimodal transport as: carriage of goods by at least two different modes of transport as basis of a multimodal transport contract from a place in a country where the goods are taken over by a multimodal transport delivery contractor and transported to a designated place located in another country.

The rising cost of energy and raw materials in 1970, after concerns imposed to ensure efficient procurement of raw materials for production, in order to do that were developed implementation programs related to the objectives of the market effectively. In this context one can speak of logistics and production logistics supply in materials management. Organizing functions (supply, production, marketing, finance, sales, etc.) resulted in "*spreading*" logistics activities within different functions, the objectives of which there were many contradictory, which generated excessive costs or even money loss.

Integrated Logistics is based on the analysis of the total cost of logistics activities, with the focus level of consumer services. This means that at a certain level of consumer services need to minimize logistic costs more than to try to minimize the individual activities cost, as components of logistics. Attempts to reduce the cost of individual activities may result in an increased total cost. The concept of total cost of logistics activities must include: the level of customer services, transportation costs, storage costs, cost control and computerization process, selling, manufacturing costs related to quantity.

Logistics comprises [4]: planning, implementing and controlling the physical flow of materials and finished goods from point of origin to their point of use, in order to make a profit and to satisfy customer requirements. The goal is to create logistic supply chains, namely as physical flows of materials to finished products for final consumers with the lowest costs, knowing that their share in the total cost of the product is around 30-40% for processed products.

One of the most prestigious groups of specialists in logistics in the U.S., The Council of Logistics Management, uses the established term "*logistics management*", which is define as "*the process of planning, implementing and controlling the efficient flow and storage bidirectional and efficient goods and services and related information between the point of origin and point of consumption in order to meet consumer requirements*" [5]. It is a general definition that manages highlight of the physical distribution management and delivery services, having as main objective the consumer need, and profit motive to ensure competitiveness.

This definition of logistics covers all three activities: planning, implementing and controlling, and not just one or two. The providers who rejects this view that supports the logistic involvement in implementing more than planning policies, by ignoring the strategic function of logistics.

Today, logistics has gone from so-called traditional approach which was focused on targeting the point of consumption, to the approach focused on flow and storage inverse (reverse logistics) and also activities which are born at the point of consumption. Logistics "*reverse*" must receive more attention now, by the increasing profitability of online purchases.

The purpose logistics, as shown in the definition is "*to meet consumer demands*", which means that logistics strategies and activities must be based on the desires and needs of consumers rather than on the requirements and capabilities of the other parties involved in the process. This involves designing and managing an effective and efficient communication system, and for businesses to communicate effectively with their customers to know their needs and wishes.

All these aspects are very important, but shouldn't be neglected as cost component. In multiple businesses, the cost of logistics activities reaches or exceeds 20% of the total cost producers, even reaching 50-55% of the cost of raw materials, which could turn into important competitiveness through cost.

The strategic dimension of logistics is underlined [6] and defined as "*the process of managing in a strategic acquisition operations, movement and storage of materials, semi-finished and finished products, starting from suppliers across the enterprise and its distribution channels with the objective of maximizing profit and prompt resolution of customer orders*".

If we chain logistics activities to enterprises producing goods and services, we can highlight three important segments that interact with each other, i.e. supply logistics (logistics inputs), production logistics and materials management and logistics distribution. If we take into account the relationship with marketing logistics, given the

marketing opportunities, aimed among others to maximize sales various market segments; we find that logistics as nothing more than a "*marketing oriented*".

In this context we can say that logistics aims to achieve a level of service to consumers in terms of the five matches: the right product at the right place at the right time in the right quantity and at the right cost. The term "*appropriate cost*" is specific to the firm's logistics system. P.F. Drucker [7], with more than four decades ago, argued that improvements in marketing and logistics are an important way to obtain products at economical cost.

2.2. Supply Chain Management - SCM

A general definition of the concept of supply chain of an enterprise includes all suppliers, production capacity, distribution centers, warehouses and customers with raw materials, semi-finished goods stock and the stock of finished goods and all resources and information involved in customer satisfaction. Synonymous terms are logistics network or supply network.

Another definition, more specifically, states that the supply chain is an economic process (business process) that connects suppliers, manufacturers, warehouses, logistics, distributors and end customers and has the form of an integrated collection of skills and resources aimed at service delivery and products to customers.

In its classical sense, the term supply chain management includes all coordination and management of all activities involved in the supply chain to achieve optimal performance. Currently, some analysts call these activities of supply chain operations, in an effort to reflect better the high degree of collaboration between the actors involved in this process.

In the context of the analyzed company, supply chain starts with suppliers and ends with its supplier's enterprise customers. Frequently, the supply chain is described with costs and revenues involved in each component:

- costs with suppliers/raw materials;
- transport costs;
- costs of production;
- storage and distribution costs;
- revenue from customers.

In the context of e-business, the importance of the chain of request (demand chain) covering order processing processes was reconsidered. Current economic conditions require firm's short-term goals, such as:

- reduce inventory;
- revenue growth while maintaining constant fixed costs;
- improved performance.

SCM applications manage forecasting applications, synchronizing supply with demand (requirement). Matching demand and ensures the ordered product at the right time. The concept of authors [8], which in turn cites the views of other authors, can be delineated at least possible functions of SCM applications:

- *planning* - is strategic area of supply chain management, which is defined resources management strategy for a particular business;
- *management providers* - developing a set of processes prospect of suppliers, supplier selection, purchase and payment of goods, monitoring relations with them;
- *manufacture/production* - scheduling, launching and execution of the production of the goods, if the company carries out production activities;
- *delivery and logistics* - coordinate receipt of orders from customers, the operation of a network of warehouses for cargo management, and so on;
- *returns management* - manage products returned by customers or by suppliers and customer relationships with various complaints.

3. ANALYTICS CAPABILITIES

Streamline the mining and analysis of vast amounts of data. Analytics streamlines the process to create highly accurate descriptive and predictive models based on analysis of vast amounts of data from across an enterprise.

Look beyond where your company's been to where your company can go. Accurately analyze past operational and financial performance over time to forecast the future. You can identify previously unseen trends and anticipate fluctuations so you can more effectively plan for the future. Factors that impact your business, such as 3rd party econometric data, national and global market conditions, weather, traffic patterns and time of year, can be identified, quantified and included in your forecasting processes for improved results [9].

Create models with unlimited variables that optimize any scenario down to the details. Analytics offers a wide array of mathematical optimization, project/resource management and scheduling, simulation, decision analysis and other operations research capabilities to enable you to build detailed models of your business or organization and create an accurate picture of current, future and potential performance.

4. BUSINESS INTELLIGENCE

Financial management aims to provide permanent organization with the necessary resources and to exercise control board on the effectiveness of these cash transactions are involved.

First functioning will be purchased fixed assets. Fixed assets include, in the case of multimodal transport contractor: buildings, land and equipment. The purchase of such goods is deemed to be capital expenditure.

Second, the resources to be used for the circulation current, or the current that are expected to be converted into cash or consumed in a period of 12 months and in a normal operating cycle. In the category of current assets of a multimodal transport contractor may be included, for example, fuel.

The third destination resource is for operating expenses which include: rent, taxes, pay subcontractors, insurance and payroll. Ensure adequate resources for operating expenses

must be one of the major concerns of the financial management of a multimodal transport contractor.

Last destination resource is the establishment of reserves (provisions) that materializes cash resources readily usable by high liquidity to ensure the company's ability to meet special events - the so-called "*dark days syndrome*" reserves are also part of current assets. The funds distributed shall finance business for the agreed credit period.

In order to monitor and control financial performance literature is recommended to calculate two indicators. The first of these is the return on capital employed calculated as a percentage ratio between net profit and total assets. The second is the commercial rate of profit calculated as a percentage ratio between net profit and sales.

We propose to calculate a third indicator that is called return on assets, calculated as the ratio between sales and total assets and expressed in lei showing how sales are generated by a loan in assets. The second aspect for safe financial management, a multimodal transport company need to consider is solvency. Indicators that we would recommend for use are leverage and interest coverage.

Indebtedness is a relationship between passive and indicating the share capital and credit for multimodal transport company is calculated by dividing long-term loans to long-term loans aggregated with shareholders' funds. Interest coverage is calculated as the ratio between net profit and interest on the loan.

Finally, last but not least important aspect on which multimodal transportation company should focus is liquidity. The most important indicator that provides information on the situation in relation to available funds outstanding commitments of the current accounting firm is the index which is calculated as a ratio between current assets and liabilities due in the short term, less than 12 months.

Management structures have come to expect a powerful tool for measuring, monitoring and tracking of key business processes. Tightening competition, managers now need to solve complex problems, often insufficiently clearly defined, with implications for multiple plans. Whichever solution is chosen among the leading business intelligence functions include:

- Planning controls lifting and cargo delivery in time efficient working conditions, distance traveled and resources used;
- Automating logistics processes;
- Workflow management in real time;
- Optimal use of space charge;
- Monitoring performance indicators (KPI) and generate reports tailored to the organization;
- Interfacing with ERP, TMS, WMS, GPS (including SAP ®);
- Automatic route planning for all types of transport: retail distribution, LTL transportation, transport containers, intermodal transport, postal and courier services, transport tanks, vehicles, naval, air or mixed.

SCM package provides several modules for different functions in the supply chain - sales of companies that purchase this package, select and implement those that fit their business. Among these functions are:

- collaboration in the supply chain;
- collaborative design;
- collaborative achievements;
- demand planning and supply;
- production planning;
- event management in the supply chain;
- performance supply chain management, etc.

As for Romania, we must remember that the Romanian companies still operate in the manner of classic traditional SCM solutions while recognizing the importance of effective business tool. Some of them have implemented SCM solutions, but limited in number and functionality. In response to market needs, the solutions presented in most cases the modules integrated into ERP application, but also with connections to applications like SCM, CRM, and BI.

5. TRANSPORTATION INDUSTRY BACKGROUNDER

The U.S. transportation industry is healthy, providing the nation with the most extensive, highest quality transportation system in the world. For the near term, the forecast is for a continued trend of expanding capability and improving service in each of the major transportation modes. Relative to other regions of the world, the United States retains the geographical and overall transportation advantage.

5.1. Trucking Industry

Trucks have carried the lion's share of the country's freight for the past 40 years. The trucking industry's market dominance will remain unchallenged in the near future, as no other form of transportation reaches so many areas with such a proven record of reliability and flexibility. Analysts expect the trucking industry to expand an average of 2 percent per year, with certain sectors (e.g., intermodal container operations and small package delivery) accounting for most of this growth. In fact, small package freight has grown to become the third largest product sector trucks carry, and demand is increasing at more than 5 percent a year.

In spite of the positive market indicators, the industry faces several significant challenges in maintaining its competitive advantage. The long-haul portion of the trucking industry is facing a serious shortage of qualified drivers. Presently, there is a shortage of 80,000 drivers, leaving 5 - 10 percent of the fleet idle.

Moreover, driver turnover is approaching 150 percent in some companies, costing the industry $3 billion annually for the recruitment and retention of new drivers. The U.S. economy is partly to blame, as truckers are able to find better paying and less stressful jobs in other fields. Over the long run, the industry will have to improve compensation

and working conditions to correct this problem. Information technology will play an incentive role here as well, allowing drivers more control over their schedules [10].

The long-haul trucking industry is also undergoing intense competition as deregulation has opened the door for many new players. To stay competitive in this environment, many small trucking companies operate on a modest 5.8 percent operating margin. The jump in fuel financially squeezes many truckers who were unable to raise surcharges enough to cover the added expense. This situation will continue as long as competition remains fierce.

5.2. Railroad Industry

The railroad industry is simply holding its own. Despite the decline in some railroad statistics, the industry remains highly capable of moving the country's freight. In fact, the steady increase in labor productivity is a testament to the impact of information technology on operations and the ease of trans-shipping containers by rail.

Railroads recognize the significant opportunity that intermodal containers are providing the transportation industry. Train companies are adjusting routes and purchasing more double-stack container cars specifically to target this important market niche. Currently, intermodal traffic makes up 28 percent of the total rail car loadings, and container handling has increased nearly 300 percent since 1980.

The railroads will remain a key segment of the transportation industry in the future. Rail will continue to be the most efficient transporter of bulk commodities and general freight that must move over long distances.

It is the mode of choice for outsized and oversized shipments and will continue to play an important and growing role in the intermodal freight business. Furthermore, the railroads are making dramatic improvements in efficiency through increased investments in infrastructure, re-tracking mainlines, and state- of-the-art locomotive designs.

5.3. Air Cargo Industry

In addition to moving express packages, air freight carriers transport high-value, time-sensitive manufactured goods that need to move long distances.

The air transportation industry is especially capital-, labor-, and technology-intensive. Airline and air cargo companies are very conscious of market trends and are constantly striving to make their operations more efficient and to earn a greater share of the market. Productivity in the industry is up an amazing 110 percent since 1980 because of wise investment in aircraft, use of a "*hub-and-spoke*" network, terminal enhancements, and information technology.

5.4. Maritime Industry

While the U.S. trucking and air carrier industries lead the world in market share and capability, the U.S. merchant marine fleet and ports continue to lag behind their counterparts in Europe and Asia. The shipping industry has fewer and fewer U.S.-

registered and -operated ships because it costs less to register ships elsewhere. The story is much the same for the U.S. port infrastructure and operation. Terminal throughput and efficiency is greater in Europe and Asia. Nevertheless, U.S. ports and inland waterways handle more than 2 billion tons of cargo a year, and waterborne traffic represents 95 percent of the U.S. overseas trade.

Analysts expect world deep-sea trade to grow at 3-4 percent a year, doubling in the next 20 years. Ports in the United States can expect a rising tide of business as international trade increases with Europe, Asia, and South America. To meet growing demand, the industry must prepare now to handle the next generation of container ships. The newest container ships will be wider and require a deeper draft.

Presently, only 5 of the top 15 U.S. ports have adequate channel depths, and of these, only the West Coast ports have adequate berth depths. Dredging these ports will not be easy because of environmental concerns. The ports will also need to expand their terminal infrastructure to include larger cranes and greater container-handling and storage capacity. Moreover, the state and local governments that control the ports will have to approve and fund projects to improve rail and highway connections to handle the increased volume of containers that will flow in and out of the ports.

6. PREDICTIVE ANALYTICS FOR BUSINESSES TRANSFORMATION

In Big Data Era, companies in a variety of industries, including transportation, more acutely feel the need to collect information most relevant to their businesses [9, 11]. They want to find a way to make decisions based on accurate information at the right time. To achieve this, the development of systems that can transform the data collected information from which to generate actions that benefit the business directly.

Some of these benefits may be:

- *Identifying growth opportunities* – internal and external data analysis can help to shape and forecasting business results, allowing identification of the most profitable growth opportunities, as well as some differentiators for business.
- *Improving business performance* – data analysis facilitates agile planning, forecasting more accurate budgeting and improved planning is an important tool for decision making.
- *Better management of risk and regulatory requirements* – data analysis allows improved reporting procedures, identification of risk areas such as compliance violation, fraud or reputation damage.
- *Using emerging technologies* – can identify new opportunities for obtaining information relevant to business management, based on new technologies.

Very few companies use the full potential of predictive analysis. On the other hand, this approach often comes into conflict with trying to keep under control and lowering IT costs. Therefore, identifying and capitalizing on available information and identifying information sources that can support the generation of new opportunities have become the main challenge.

In the digital age in which we operate, the volume of data generated is growing. Every minute of every day, more than 200 million e-mails sent globally, and Google gets more than 2 million search requests. It is estimated that by 2020 around 450 billion online transactions take place every day. Given this context, organizations consider data as a fourth factor of production, besides capital and human and material resources.

Effective integration of predictive analysis in business management has a measurable impact on performance because it allows better planning, weather clearer and more informed decisions, resulting in increased profits, reduce risk and increase business agility.

Using predictive analytics is useful transport companies to ensure that all relevant functions involved in the process so as to obtain an overview and to minimize information leakage. Information about consumers are a typical example in this respect: sales have billing addresses data and record transactions, marketing has information obtained from the analysis of feedback coming from consumers and the logistics department has details on concrete deliveries. All this information can sometimes double or vary from one department to another [11, 12].

A coherent analysis of all these data can be a challenge, but an accurate analysis and enhanced business can generate added value. Companies that monitor and estimate how consumer behavior and preferences evolve it without exceeding the limits of confidentiality, can gain significant advantages.

7. LOGISTIC IN ROMANIAN INDUSTRIAL ENTERPRISES

In the last fifteen years, the managers of Romanian industry faced multiple problems caused by difficult economic instability, inflation, shortening product life cycles, environment, market conditions and diversification of demand. All this makes it difficult to find a way to organize the most effective and efficient the logistic companies in general and in particular.

Currently, there are industrial companies, primarily those with private capital, which have a good timing and efficient logistics organization; however we can speak of an effective organizational structure of logistics in a few enterprises.

A concern of integrating logistics activities under a single authority is meeting since 1990. Thus, we can say that companies who designed and developed logistics organization as organizational structures were oriented primarily towards transport and storage activities that are included logistic managers to control more than 70%, followed by the order and delivery, inventory control and supply.

This large and medium-sized logistics function is headed by a manager to the position of Vice President or Executive Director. The introduction and development of logistics in the value chain of Romanian enterprises were made under the pressure of two forces, namely:

- Transition to a market economy, a process that Romanian firms subject to increasing pressure of competition, lower costs and eliminate competitors access

to public resources leads firms to reduce capital requirements by resorting to logistics;

- Integration of Romanian firms in the global economy, especially taking performance of components and operations of the final products whose realization depends on participants located in several countries, requires discipline and rigor logistics contract enforcement [13].

For better international coverage Romanian logistics system should allows businesses, primarily SME's, to exploit the opportunities offered by the development of international trade in goods and services, by exploiting the competitive advantage offered by logistics.

Currently there are a number of challenges facing the transport system and its development that led to increased competitiveness and development in energy efficiency technologies. Thus, a more accessible transport system should be prioritized traffic management.

Regarding freight for the whole transport system efficiency, in addition to encouraging projects aimed scheme applied to freight and developing new solutions for the delivery of goods, smart technologies and Intelligent Transport Systems (ITS) play an essential role in achieve the objectives of transport policies on developing an efficient, effective and sustainable.

The role of ITS is generated by the problems caused by traffic congestion and development of new information technologies in simulation for real-time control, communication networks, providing the opportunity to address issues related to urban traffic management in an innovative manner. Congestion reduces efficiency of transportation infrastructure and has a negative impact on travel time, pollution, energy consumption.

In urban traffic management and logistics are key factors underpinning the successful implementation of ITS and for involving stakeholders, development of partnerships, the application of essential tasks, optimize network performance, maximizing automation and minimize human intervention at the operational level.

8. CONCLUSIONS

Predictive analytics helps companies move from a decision-making process retrospectively and intuitive, proactive and oriented to one based on information. Based on this approach, companies can build models with which to make better forecasts on scenarios as realistic and provide the opportunities and challenges associated with them [12].

In a digital world in constant evolution, with growing volumes of data generated, only those companies that will build on the information will be able to increase their competitiveness. Business performance will depend on the ability of the organization to have access to accurate information and to exploit. Those organizations that can understand and filter relevant information that will know how to discover patterns and act on the results thus obtained will become businesses with top performance.

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