

THE IMPACT OF ROAD TRANSPORTER DEVELOPMENT TRAJECTORY ONTO CARGO SAFETY AND SECURITY

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ABSTRACT

This article attempts to reveal the general behavioural norms of cargo carriers, with a predominant emphasis on security issues. The security awareness level of road transporters has been found hugely dependent on management capabilities. Additionally, this poses a risk factor indicative of a shipment load's quantity and value. At a certain level of road transporter development trajectory, broad research delineates a sharp increase in security awareness, stemming from leadership recognition at larger companies. The results of the following research findings are significantly similar to various well-respected scientific theories which verify the hypothesis that the principal barrier to developing a company is a combination of a lack of management capabilities and an unwillingness to adapt to change.

KEYWORDS

transportation, security awareness, management capabilities

CLASSIFICATION

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INTRODUCTION

The purpose of this article is to assess the measurement of the security awareness level of road carriers operating within Hungary. The topic seems relevant as the largest percentage of Hungarian foreign trade is handled within Europe and the proportion of road haulage corresponding with rail freight volumes is increasing. Consequently, most foreign trade shipments travel by road. The claims value arising from security incidents linked to road transportation in Europe has risen to millions of Euros per year [1]. This article deals with basic questions and correspondences of developing security awareness that could be a result of previous empirical experience, the size of a company and its adaptation to market demand. This article is the final section of a multiple article publication on this topic. Previous research findings [2, 3], revealed that security awareness is not a homogeneous factor, as the dynamics and awareness coincide with the size of a company. This document seeks to prove the relevant scientific literature and to present the findings and circumstances of the connected research. The hypothesis indicates road transporter security levels differ. However, it is possible to profile the carriers based on certain criteria. A further objective of this project is to verify the overall results with tendencies as described by proven scientific theories [4-7]. As a result, shippers may be able to concentrate their management efforts on pre-specified security risks by referring to general profiles. A carrier's security level is one of the basic pillars of supply chain reliability. Consequently, this affects the supply of resources to varying given manufacturing destinations. This approach verifies carrier value based on reliability rather than on service portfolio rendered.

STATE OF THE ART

There appears to be a gap in scientific literature regarding the analyses and profiling of security attitudes towards road carriers. Much research has been carried out in the field of the supply chain management theory, examining a wide scope [8-13], which in part is relevant to this topic and provides a scientific background for an evaluation of carriers. Supply chains are examined in detail from multiple relevant publications. A literature overview and summary focusing on relationships in supply chains was published by Ványi [14], a similar approach aimed at logistic service providers was undertaken by Karmazin [15]. Another pertinent research field is the innovation and development of Hungarian companies [16-18]. A limited amount of Hungarian researchers have recently addressed cargo transportation issues [19]. An analysis of the latest trends and their effects on the transport industry has been worked out in detail. Bokor [20] defined reliability as paramount criteria, which comprises security and safety. His study is relevant to the road transportation industry as it systematically defines the selection criteria of transportation modes. In conclusion, the author anticipates a further increase in the use of road services. Bank et al. [21] reveal the profitability of Hungarian road carriers and project the forthcoming trends of the industry. Furthermore, logistic service providers have recently been widely researched in Hungary [15, 22], however road carriers have not. International authors have recently published findings regarding safety culture within the transportation industry [23]. There are multiple studies that deal with subcontractor vetting and selection criteria, defining security as a core element [24]. Personal competences, such as obtaining security and safety are hugely significant during the recruitment and selection process in human resource systems [25]. International studies relating to supply chain security awareness indicates that security is an integral element of managing business risks. Methodologies and systemised metrics have been developed [26] in order to establish a proper security design. Similarly, other researchers have focused on the impact of security culture on security operational performance [27].

The apparent lack of in-depth studies in the area of security awareness triggered the conduct of research pertaining to Hungarian road carriers. The basis of the original hypothesis was to question the incongruity of security awareness.

RESEARCH METHODOLOGY

According to Rubin and Babbie [28], the advantage of a questionnaire is the ability to define the characteristics of large quantities, providing the possibility of a detailed analysis and leading to a good standardisation. The disadvantage of a questionnaire is the limitations caused by research participants' admissions and their validity [29].

This research addresses the analysis of information obtained from the carriers' feedback. Furthermore, it puts the findings of the interviews into context. The objective during the sampling was not to represent the entire Hungarian carrier market, as the primary focus was on companies that apply for subcontractor status at a logistics service provider within a given time frame.

QUANTITATIVE RESEARCH: SUBCO VETTING FORM¹ ANALYSIS

During the quantitative stage of this research, statistical methods were applied to analyse the pre-audit data collection questionnaires sent from an internationally and locally well established and leading global logistics provider². The practice of the company was to screen the new road carrier applicants prior to the start of any commercial business with a multiple aspect questionnaire. Feedback based on the questionnaires provided the structure for every personally conducted on-site audit, regardless of whether the company was being examined or re-audited for the first time or not. The auditing procedure was periodically repeated for already established partnerships or when a significant failure occurred. 101 questionnaires were examined during the time period of 2012 and 2014, regardless of whether the audited company was later accepted for business partnership establishment or not. The auditing company adopted the use of a new online subcontractor vetting and registration from 2014. This questionnaire globally unifies and defines its questions differently from the aforementioned, according to the screened parameters. Consequently, the data received could not be compared to the data obtained from the earlier period. The amount of 101 samples was sufficient enough for observations and for obtaining vital correspondences.

QUALITATIVE RESEARCH: INTERVIEW

To be able to examine the results more deeply and ascertain a clearer understanding, the use of detailed interviews as a qualitative supplement for the questionnaires were conducted with the security and quality managers of the logistics company for verification purposes and to determine the reasons for varying results from the individual company groups. This interview to the double only served to strengthen the initial findings.

INTRODUCTION OF THE PARTICIPATING COMPANIES

The research data and the returned Subco Vetting Forms were collected during the time period of 2012 to 2014. Parcel providers (Couriers), were excluded due to their irrelevant work dynamics and expectations. An additional criterion was that companies use pallet-based cargo transportation. Furthermore, the incomplete questionnaires were discarded. Altogether, 88 out of 101 vetting forms based on the criteria were considered. More specifically, re-auditing was conducted once for 66 companies, twice for 17 companies, three times for 4 companies and one company on four occasions. The total number of vehicles examined was 935, resulting in an overall average of 14 per company. The complete number of employees was 1322, with an average of 20 per company. The number of vehicles per company varied

between 1 and 85. The companies were predominantly registered as Hungarian Ltd's. However, eight companies were registered in Slovakia as Sro.-s and four as Hungarian self-employed or general partnership arrangements. During the crosschecking of the data some failures were detected. These comprised, zero vehicle units given, less truck drivers than trucks and more drivers than employees. Any inconsistent data was verified from other sources, such as the Opten³ data pool or the companies own presentation materials.

RESULTS

Researchers found that Hungarian companies significantly differ on using supply chain and risk management tools. Nagy and Venter's study in 2010 unveiled the existence of two separate company clusters, one developed and the other undeveloped [29]. Authors summarised that even the developed company cluster indicated a similar lack of middle values, in the adaptation of the individual tools. For information sharing and cost, performance measurement was more significant than the usage of material flow tools which denoted weakness in this cluster. During the first step of the data analysis the findings were not dissimilar to those of Nagy and Venter, in that road carriers were also categorised into two major clusters comprising two subgroups each.

SPLITTING BASED ON COMPANY SIZE

This section is based on the outcome of previous empirical research [2, 3], which provided a categorisation of the carriers based on their different security approaches. The most typical parameter of road carriers is the number of vehicles they operate. The target was to cluster the participants and unequivocally divide them based on their security awareness. In the course of earlier research conducted the following group's results showed significant correlation, therefore the rest of this article incorporates this method of grouping:

- Group 1: (companies with 1-2 vehicles), the driver is typically the owner or a close relative, administration is conducted by the same.
- Group 2: (companies with 3-14 vehicles), the owner very seldom drives the trucks. They started out by acting as a company, office employees are already present, but typically no owned premises exist.
- Group 3: (companies with 15-30 vehicles) generally have their own premises already, the company has good references and the owner is a competent skilled manager with a higher degree.
- Group 4: (companies with over 30 vehicles), financial investors often show up in the background, they carry particular weight within their region. The company is able to handle larger demands on its own.

The overall outcome of the earlier research regarding the security awareness measurement of road transporters is shown in Figure 1. The abscissa indicates the carrier categories grouped by the operated number of vehicles and the ordinate highlights the average compliance with the security audit.

The following section of this research article will test the rigour of the results obtained in multiple respects. The examination will adapt the use of three widely popular theories from three different professors. First, Drotter's conception defines the management development pipeline in the field of social science. Secondly, Christensen deals with the definition of different innovation types. Finally, as a foundational basis, Fischer's theory on the nature of supply chains has been incorporated. The three theories approach the topic from different angles which provide a full-scoped analysis for the observations. New research areas will be defined stemming from any new results.

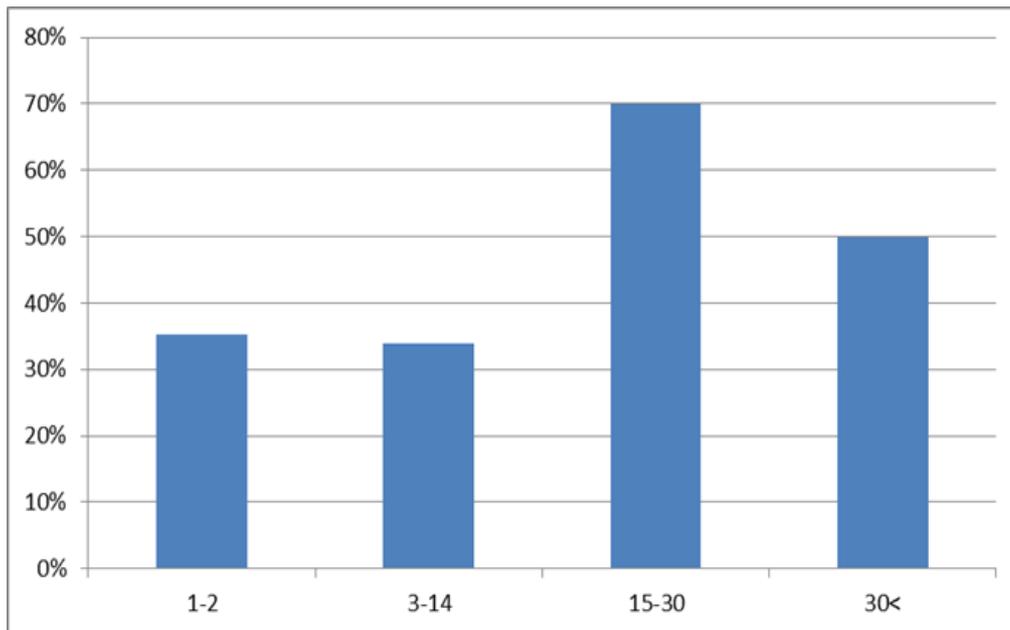


Figure 1. Average security awareness level of the Hungarian carriers.

RISK AND LIMITATION

There are multiple requirements for a company to be successful on the market, while at the same time maintaining financial stability. Adaptability, compliancy to the constantly changing demands of the market, the environment, competitors or labour market and the challenges caused by emergency situations appear to be the most pivotal attributes required. Additionally, the reaction time is a crucial element of success, which comprises the employee's education, experience and motivation towards each new challenge. A company's normal path to progression should challenge the organisation no differently from any other changes. Development is easily manageable for an organisation if it stays within its comfort zone. In other words, changes may be handled via a more intense use of the already given resources. It became correspondingly apparent that the number of trucks provided a snapshot of the carrier's organisational maturity. Interestingly, the development level correlated with the number of operated vehicles, as companies incorporating more than 15 trucks proved to be more developed. Transporters were divided into developed and undeveloped clusters having two subgroups each and the observation denoted that developed cluster members have a high security awareness level, whereas, underdeveloped group standards were unacceptably low. Moreover, security was heavily dependent on the company's management talent and human resource capabilities, which again seems relevant to the aforementioned attribute of adaptability.

DROTTER'S MANAGEMENT PIPELINE

Drotter and associates defined a management pipeline [4], which shows the experiences and capabilities of the employees within an organisation. At a later stage, management values are added to the different levels of the pipeline [5]. The research indicates that the majority of the Hungarian carriers fell into the category referred to by Drotter, as a small business. In this case, the development of management capabilities mainly depends on the owner as they can foster or discourage any organisational and company development, such as using modern management tools, a flexible approach, applied values and the evolution of security awareness. Drotter's objective was to study the succession planning of large companies. Additionally, his approach is valid for individual management development stages too. Drotter defined six leadership passages which are defined as:

Managing others

The initial management level starts when an individual's performance is not merited by their work alone, but through the responsibility for others job's. Usually high performers differ from the rest of the workers and obtain the possibility of becoming a first line manager. However, the difficulty they face is that success is no longer enough, as it is insufficient to complete their assignments thoroughly and in good time. Many do not recognise or implement desired behavioural and value-based changes. Newly promoted leaders have to accept the challenges required for their position. A carrier's first big developmental hindrance is to manage without acknowledging the need for change. The majority of transport entrepreneurs were initially simple drivers, who find it difficult to manage others. Individuals at this level must learn to value and practice the management role, as it is insufficient to merely tolerate it. This is the first level of a successful operational strategy, where it is imperative to enhance the capabilities of others and eventually delegate their own responsibilities to others.

Managing managers

Leaders at this stage should only deal with management tasks. Additionally, it is a general expectation to have an understanding beyond their work description and to be able to interpret strategic questions. Furthermore, the education and training of first line managers should become a compulsory part of their scope of duties. Based on Drotter, this passage is connected with the sequential following passage and should not function separately in a small business. This is the highest level objective of the operational strategy where leaders should value change by focusing on productivity increase.

Functional manager

Business unit leaders and support function managers such as the HR manager or the CFO of large companies fit this description. Leaders in this respect often face the challenge of managing new tasks with no direct relevant work experience. Functional managers should create teamwork and value its importance. They should participate in the creation of a long-term strategy which requires an understanding of how the given activity can be competitive on the market. Creating sustainable competitive edge capabilities should be the leader's most important task and governing value. This is the first level of business strategy.

Business manager

Drotter's definition of a business manager contains elements that equate to the tasks of a highest positioned leader at a national entity of a multinational company. The position is referred to as the local CEO, general manager, national manager or managing director. As small companies are not on a regional or global level, the business manager has to perform the group and the enterprise manager roles too. It is a key position with multiple responsibilities. This way of thinking should be focused on margin and profit production capabilities. The business manager should be sensitive to the diversification of the production functions and should have a three to five year plan, observing a correct balance between future targets and the necessity of the present. This position is at the top end of the business strategy creation.

Group manager

Drotter defines a multinational companies' regional manager as the group manager. Leaders who are successful at managing a business or a country come under this bracket, frequently later acquiring management of additional, similar businesses. It could be suggested that it is better to title the position as regional manager, because current organisational structures often fall under the matrix arrangement of multinational companies. Functional and regional roles

are often carried out by the same person. Drotter gives the most detailed job description at this level, delineating that a regional manager should possess an overview of a global business and strategy. The main criterion is that the group manager values other individual's success and accepts that they may receive the most recognition and appreciation, instead of themselves. The success of the employee is also the group manager's success. An additional target is to develop an adequate portfolio as part of a company strategy. Small businesses do not require this level of planning.

Enterprise manager

An enterprise manager is the global number one leader of a company. Responsibilities include analysing quarterly reports, assessing the company's performance, determining and implementing long term strategies. A global leader must make three to four major decisions per annum while retaining an overall standard performance.

Drotter offers some further characteristics pertaining to this topic:

- To be successful at a certain level does not depend on past performance.
- If leaders cannot comply with the requirements of the given passage, the employees should leave or worse still, continue providing an ineffective performance.
- Significant numbers of small businesses fail to develop and implement new management levels, due to inflexible leadership.
- Failed transitions in leadership passages are typical due to reluctance to relinquish a manually steered leadership approach and eventually participants could not or did not want to adhere to the requirements and dynamics of the next management level.
- Financial investors often change the previous owner due to the reasons given above and hire a professional from a larger company.

There is a strong relationship between a company's development trajectory and the described pipeline based on the owner-manager's skills, education and experience. Drotter's findings could be defined as a transporters development barrier, eventually understanding the behaviour of companies comprising different fleet sizes. A company on an individual level, where the driver owns the company, adheres to different prioritised values than a large company, having multiple management levels. Findings indicated that the security awareness level is heavily indicative of the management capabilities of the owner and whether or not the leader observes and carries out the given passages, adapting to the required changes in governing values and their implementation. Furthermore, it could be firmly suggested that not anybody can be a successful leader where people-handling and intelligence skill sets are paramount. At a larger company an effective leadership pipeline should filter unsuitable candidates. However, in small businesses, the owners have to judge their own capabilities as to whether or not they are confident and able to progress to the next developmental stage. Incorrect self-assessment may result in underperformance or damage to a company. An additional temptation is the contented feeling of current success at all company sizes, providing a false confidence in performing well at the next level. Carrier size-based ranking may also mirror the leader's management capabilities. Given that a companies' general aim is to continuously develop, it could also be argued that an increase in a company's size should automatically follow. Expanding the size of a successful business is a typical methodology for gaining financial progress. The current status of the carriers is a mere overview of their development trajectory. Drotter's pipeline was aligned with the carrier groups defined earlier in order to test the credibility of the hypothesis.

Drotter's pipeline confirms the findings as outlined in Table 1. The small business' leadership levels are divided into four groups as are the carriers. Therefore, it was concluded

Table1. Drotter’s pipeline aligned with the carrier groups.

Level	Multi-national	Small business	Carrier	Strategy	Value	Security awareness
0	individual	individual	1 st group	operative	performance	instinctive/low
1	managing others	managing others	2 nd group		job allocation	subconscious/low
2	managing managers	functional manager	3 rd group	business	productivity	conscious/high
3	functional manager				competitiveness	
4	business manager	business manager	4 th group	company	profitability	Conscious /adequate
5	group manager				product diversity	
6	enterprise manager				sustainability	

that there is a strong correlation between the carrier’s management and their security awareness level. Transporters that focus on business strategy beyond the everyday load of operational tasks, reflect less organisational risk. A respect for security and safety first appears at this stage as a prerequisite for improved productivity and a competitive edge. The leader acknowledges the decrease of productivity related to security and safety incidents, regardless of its nature (operational, cargo, health and property safety and security). The carrier’s third group is most suitable for transporting sensitive shipments, due to the high security awareness and the size of the company. These carrier companies are the maximum size that constitute being transparent and manageable for a leader. It is typical to achieve an outstanding operational performance, but no excessive risk avoidance shows up at this level. However, in the fourth group, larger companies require more internal rules and predefined procedures resulting in an official declaration of risk avoidance. The predominant governing variable of this sized enterprise primarily focuses on sustainability and profitability, as highlighted in Drotter’s theory. Consequently, management does not consider the potential extra profit that could be gained from sensitive cargo for fear of uncontrollable financial loss. Despite a lower level profit margin, sustainability and assured profitability are paramount.

THE IMPACT OF MARKET COMPETITION

The evolution of security is not solely contingent on organisational issues, but additionally by the market environment. On the condition that customers have a standard security related demand, the further determining factor is the service portfolio offered by competition. No companies can afford to fall behind its competitors in an open market environment. As was proven earlier, the creation of a business strategy and observing the market participants requires a decent company size, constituting above 15 operating vehicles per haulier. Based on findings from Clayton M. Christensen [6], companies generally focus on their high margin customers, who typically account for only a small portion of their total client portfolio. Services and products are primarily developed for this category with the majority of clients having to pay the innovation surcharges included into the product or service prices, despite the fact, that they would be satisfied with a cheaper, lower standard. Based on the theory of disruptive innovation, if the evolved market gap becomes large enough, the opportunity arises for a new competitor to enter the market with an inferior, cheaper product. The disruptive enterprise then attracts the masses, providing lower rates in hopes of a smaller but

predictable profit margin. According to this research, the attributes of the fourth carrier group are not dissimilar to disruptive innovators, while the third group's behaviour shares similarities with the affected disrupted market player. The third group stands out from the market through rendering special services, while larger companies are significant through size alone. This research did not indicate any similarities to Christensen's theory regarding the first and the second groups' behaviour of manufacturers consciously targeting consumer groups at the time of market entry, as the carriers did not provide an intentional competition strategy. The primary focus of the underdeveloped cluster was merely operational and financial, providing stability alone, while simultaneously neglecting strategic planning. Christensen's theory concurs with the results of this research, with the modification that carriers first announce business strategy, after reaching a certain maturity level. Existing strategies will continue to encourage market participants to adhere to a higher security standard and to increase security awareness as long as the market demands it. Consequently, the increased operating expenses will be the main hindrance to furthering profitable growth. Competitors operating at a lower cost and security level will appear disruptive and close successful business deals on favourable terms. Surprisingly, the excessive security level is disruptive to development at this stage. It could be argued that this is the reason for the decrease in quality of security tools and procedures in the fourth group, in contrast to the third carrier group. Additionally, carriers may not go bankrupt as suggested in Christensen's theory, but transform to serve the volume demand while lowering the service standard.

THE IMPACT OF SUPPLY CHAIN TYPES

Supply chains vary based on product types. Fischer differentiates two types of product groups described as innovative and functional [7]. These differ in nature, requiring variant, specific supply chain management. Functional products provide predictable demand, a long lifecycle and narrow margins, requiring effective supply chains. This study shows that this kind of management can be best supported by large fleet operators, as the shipments are available in large standard volumes, pertaining to the fourth carrier group, preferring sustainability and stability as core values. A typical element of an effective supply chain is the continuous, cost-focused operation. The predetermined expectation was confirmed from the findings that large carriers may reduce their security related costs in order to meet the client's low cost expectations.

Fischer states that innovative products have an unpredictable demand, a short lifecycle and a high margin requiring a flexible supply chain, focusing on fast reaction times and an elementary demand for cargo protection. It is commonly accepted that flexibility requires extra management efforts and better operational execution capabilities. Research revealed that companies incorporating such qualities are mainly lead by educated, experienced people and the size of the company does not exceed what one person can transparently manage. Based on the aforementioned carrier groupings, the necessity of the third carrier group best serving customers with innovative products and a higher security level was confirmed.

No explanation for the security level of the undeveloped cluster was found. Both Christensen's and Fischer's theories do not appear to elaborate on the existence of the measured management levels as authors concur that carriers may already have a minimum security level by the time of market entry. The difference between these theories and the research propose further questions to be addressed:

- Who will cooperate with carriers entering the market without the compliance of a minimum security and safety standard? Should another market segment be addressed?
- Could the underdeveloped cluster be improved through another party's management surveillance?
- Is standardisation a future research area that could provide more transparency and manageability?

MATTER OF RELATIONSHIP

Small carriers appear to approach business hugely on the additional premise of personal relationships. Good relationships, based on mutual favours rather than hard facts such as the price, are often considered. Adherence to compliance regulations seems to be beneficial by conducting business solely with multinational companies. Alternatively, from financial remuneration paid by the carrier to the dispatcher, many additional favours may be rendered, such as delays forgiven, lighter payloads, earlier payments or more favourable destinations assigned. In return, capacity availability during high season or flexible handling of mandatory driving hours is overlooked. In particular, small town carriers have close relations with local manufacturers in many ways, as these are often relatives, school mates or friends working together. A further influential factor is local patriotism, which may strengthen the usage of regional subcontractors giving extra value in the selection procedure. All these connections make changing the supplier very difficult and give the trucker a sense of job safety. The lack of competition may create issues due to underdeveloped security features. Furthermore, the rigour of Christensen's theory regarding the above has been proven due to discovering the real market demand for carriers entering the market with low security awareness.

PRESENCE OF INTERMEDIARIES

Intermediaries in cargo transportation are known as freight forwarders, which are mainly non-asset based and their core business is transport organisation. Using a freight forwarder instead of a trucker directly has multiple advantages, such as increased knowledge level regarding routing, regulation, transport equipment, market conditions and experience with an extended number of carriers. An obvious explanation of the findings related to the underdeveloped cluster is the usage of intermediaries. Freight forwarders have an active subcontractor vetting system not dissimilar to the one examined here. As a result they provide a safe pool of selected carriers linked to the related transport order. Furthermore, they develop the carriers to their security standards by using economic power. The situation is advantageous for the trucker as well. New start-up carriers on the market can learn the business under the umbrella of a large intermediary accepting and developing security standards too. Not only newcomers work for forwarders, but additionally small family companies not willing to step to the next level. Another consideration in choosing a freight forwarder as a supplier is the capacity constraint arising from ad hoc freight conditions (destination, cargo size, volatility), whereas the added value is the availability of an evaluated carrier database. This competence can only be developed through an intensive workload over a long period of time, typically 2-3 years, including searching, interviewing, vetting, auditing and regularly re-auditing. Larger shippers normally gain such knowledge by themselves and may switch from using freight forwarders to the use of carriers.

IMPACT OF THE MANUFACTURERS SIZE

As the carrier's size is related to their management knowledge, the same applies for shippers. Small or start-up manufacturers may lack cargo transport experience. Not knowing something usually leads to underestimation of its difficulty and the associated risks. Experiencing issues tends to generate learning curves. A combination of a small carrier cooperating with an inexperienced manufacturer may explain the underdeveloped cluster due to a lack of knowledge on both sides. These shippers normally do not recognise the necessity of involving larger carriers or freight forwarders and remain in partnership with similar sized truckers. In this instance, the shared objective of both parties is to manage operations. The educational level and the mutual understanding provide a convenient feeling of equality. Despite all that, companies producing low value cargo or transporting goods that are not subject to theft may

benefit from the partnership without issues for a substantial period of time. This approach indicates dissimilarity to Fischer's theory as the selection process of carriers does not seem dependent on the type of supply chain, but rather convenience and location.

RAISING THE PERFORMANCE

As a summary of the above reasons, there are many grounds as to why security performance may remain poor:

- Carrier did not develop relevant management skills,
- Handling low risk cargo,
- Lack of cargo transportation knowledge from the manufacturer's side,
- Lack of local competition.

Upgrading security performance to the minimum level is a vital requirement. As a reflection, carriers adopt to the market requirements during their development trajectory. It is possible to boost their learning curve in artificial ways:

- Create easily available and trackable overall standard requirements on the market. This should consist of standards for low risk and high risk cargo as well as reflecting other aspects such as the effective or innovative supply chain requirements. Comprehensive usage of standards may lead to a declining number of cargo crimes.
- Involving a well respected freight forwarder is an effective way to enhance security and to gain transportation knowledge at the same time.
- Involving a carrier with a higher security awareness level would automatically reduce the exposure to risk.

Figure 2 visualises the situation with and without involving external standards. The external standard can be defined by professional associations, large producers or a freight forwarder.

In Figure 2 the fluctuating blue line delineates the awareness level of carriers reflecting the findings presented. Additionally, the red line indicates the freight forwarders standard expectations, which are predetermined and examined via their subcontractor vetting activity.

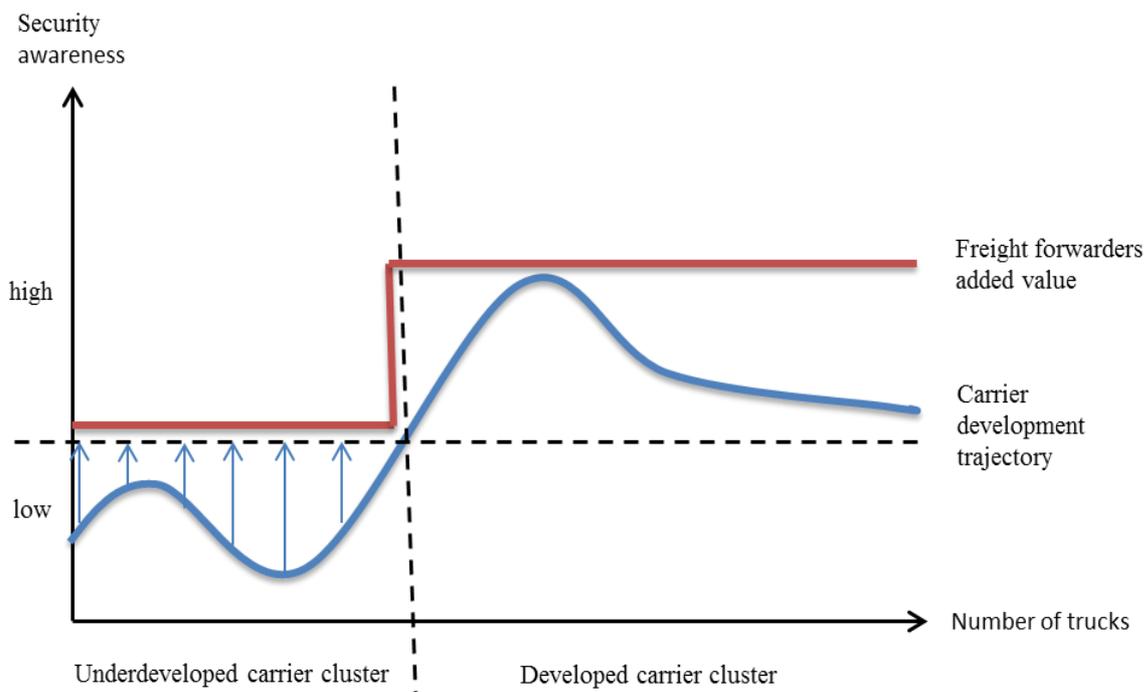


Figure 2. Elevation of security awareness level involving freight forwarder.

Carriers meeting the standards will be awarded with transportation contracts, while others will not. There are three different scenarios illustrated on the chart.

- Underdeveloped carriers can be developed by the freight forwarders to the required minimum level.
- Developed carriers, especially those belonging to group three have the highest security awareness level, meeting the highest standards. In this case, the forwarders have little room left for adding value.
- Developed carriers belonging to group four do not intend to transport high risk cargo. Security level is decreased, making room for the forwarders to sell added value. However, the market does not really demand it.

Setting external standards would have the same impact on carrier's security awareness. A more in-depth research of manufacturers may possibly answer any open questions. It could be suggested that the results are merely partial elements of a more complex economical system, influenced by situational dynamics. Future research could focus on a more specific analysis of the overall environment.

CONCLUSIONS

The research findings regarding Hungarian road carriers were tested against multiple science theories. Their statements were found relevant and hypotheses were proven in many aspects. The leadership pipeline theory created by Drotter and other authors confirms the carrier behaviour presented here. It could be stated that road carrier's management know-how corresponds directly with security awareness. Consequently, the risk factors associated with carrier company size, could well be standardised. Further analysis based on Christensen's theory led to modelling the carrier's product innovation stages during their development trajectory and the result supplemented the original theory, providing possible future research fields. Dissimilarities to his theory indicated that carriers could reach the company size required by volume businesses through natural development, resulting in being able to render the service parameters equal to the disruptive innovator. In this case, the disruptive innovator would not take over their place on the market, but merely influence the strategy.

Fischer's model of clustering supply chains was integrated successfully into the developed carriers' grouping research. Fischer's theory regarding supply chain management precisely reflected the carriers' third and fourth groups, but did not account for the behaviour of the first and the second groups. This indicates that the value of the transporter is dependent on the type of supply chain they are engaged with. Cargo transport, if well organised, accompanied with a conscious selection of management can provide a paramount element to the supply chain. Additionally, it is conclusive that a procedure selection failing to incorporate the above findings, may well result in insufficient carrier partnerships, differences in values, goals and basic understanding.

Not only soft factors, such as local patriotism, behavioural topics or relationship based business nature have been incorporated to strengthen the findings of this article, but also factual reasons were addressed. The latter comprised a risk of theft, the size and cargo knowledge of the shipper or the involvement of intermediaries. These elements provided sufficient explanation for dissimilarities noted to Christensen's and Fischer's theories. Additionally, this article revealed the area of adding a freight forwarder's value to cargo safety.

Further research of the examination of shipping companies' behaviour, management tools, the background dynamics of the discovered behavioural patterns and the entire overall system may be conclusive.

REMARKS

¹Short terminology of the excel sheet used for the subcontractor's vetting.

²Kuehne Nagel Hungary.

³Opten: information pool of company register data.

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