



## FUTURE CHALLENGES AND AREAS OF DEVELOPMENT FOR SUPPLY CHAIN MANAGEMENT

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**ABSTRACT. Background:** The direction of global goods flows and the growth of nodes in trading networks have a significant impact on the development of logistics HUBs. The turbulent economic processes currently occurring in the world, the effects of globalization and “glocalization”, customer expectations and changing purchasing habits, and the increasingly deferred differentiated solutions in supply chains have a major influence on the emergence and spread of new technology solutions in the delivery of goods.

**Results:** This change has a significant impact on logistics processes as they face changing tasks and challenges in supply chain management. The authors intend to address this impact in their article, which also takes into account the results of international scientific papers. With the onset of the new millennium supply chains became more complex. The changes in the volume and geographical shift of goods that are traded redefine the topology of the world’s goods flow distribution. By presenting a deeper analysis of the effects, this article approaches the above-mentioned considerations from various perspectives; as yet we cannot judge which of these considerations will be the strongest, nor how the main priorities will develop.

**Conclusion:** The best answer can only be given by future events, although the authors’ modelling of the impacts and the evaluation of potential trends may indicate certain favoured directions. We can also conclude that information technology tools have a great influence on boosting economic processes and faster networking.

**Key words:** supply chain, globalization, servitization, trust, Information Technology, Internet of Things.

### INTRODUCTION

To make clear declarations and represent an unambiguous position regarding the challenges in the title of this article would be a bold move on the part of the authors, but taking the title as a question we can embark on a presentation and analysis of some fundamental and – in terms of the future – crucial processes. In order to give the best answers to the authors’ question, it is essential to include in the thought process a description of the dominant trends in a turbulent and changing international economy. Fast changing market environments and fluctuating customer demands require the efficient operation of logistical processes [Kovács, Kot 2016]. In recent years,

globalization processes have accelerated and the uncertainty about how markets will evolve has made it increasingly important for companies to be aware of the supply chains they participate in and to understand the roles that they play [Kot 2014].

In addition, it is vital to ensure that any statements made take into account opinions regarding social, political and natural disasters, IT (Information Technology) developments and the unceasing spread of innovative technology, as well as discuss various analyses of the effects of new measures.

## COUNTINUALLY CHANGING ECONOMIC TRENDS

The trends in the ever-changing international economy are driven by general trends, such as internationalization, the strengthening effects of globalization and glocalization, steady growth in international competition, corporate attempts to outsource and reduce the number of suppliers, research, development and innovation, shortening product life cycles, shifting to time-based competition, and changes in customer buying habits and supply chain strategies [Szegeci 2011]. In addition to the general impacts on the global economy, based on trends experienced in the logistics field, specialists predict an increase in commodities over the next few years.

The organization and implementation of the supply of goods between supply chain members should be organized in such a way that economies of scale (cost-effective methods which bridge large geographical distances) and economies of choice (customised services offered) apply simultaneously to chain members [Bowen, Leinbach 2004]. Since the management of links between supply chain members is carried out by logistics service providers and their importance and role have been strengthened recently, the comprehensive, scientific examination of logistics service providers is current and necessary. According to [Lukassen, Wallenburg 2010] the work of LSPs has been increasingly recognised during the last few years, as has the significance of functioning supply relationships [Huemer 2012; Ślusarczyk 2017]. This effect is also reinforced by the statements made by the executives of large corporations, which show that the volume of goods in international commodity flows is twice the volume of goods actually produced [Karmazin, Ulechla 2015]. This finding is underpinned by the fact that there is an ever-increasing need for goods flows generated and serviced by large companies both centrally and within related subsidiaries.

Therefore, globalization promotes the development of supply/distribution logistics. Regarding production, globalization leads to

the development of international networks. Therefore, production is carried out in the most cost-effective sites, where spare parts and subassemblies are often manufactured separately, just like the final assembly. Supply chain development and integration are one possible way of reducing costs and inventories to increase efficiency and to optimize processes, which may arise partnerships in the long run. Besides the determination of optimum inventory level, particular attention is paid to inventory holding costs [Oláh et al. 2017a].

These forecast developments for e-commerce and its uninterrupted popularity will also have a major impact on the growth of commodities in logistics systems, their size and diversification; the Forrester Survey, for example, predicts a 20% growth for China over the next 5 years. By narrowing the geographic outlook to Europe, we may well see an increasing penetration of e-commerce here, too. In Germany, traders find that consumer products which have previously required a personal presence at the point of sale (such as shoes and spectacle frames) are also popular with consumers buying over the Internet [Brandtend 2014]. In Hungary, the share of e-commerce is currently 3% [Balatoni 2015]. Changes in consumer habits and new sales incentives by commercial units are predicting an increasing share of sales for online commerce. International e-commerce effects are expected to have a significant impact on logistics systems, including distribution processes and solutions. The number of actors in the supply chain has fallen as an effect of e-commerce. Structures have been created that, in the event of their realization, will mean that some market actors will not participate in selling products to the consumer. In a supply chain of fewer players, transaction costs are reduced, and by reducing stock in the chain the manufacturer receives more accurate forecasts of demand, and continuously senses that demand, and consequently is able to eliminate excess inventory and keep the volume of products at optimum levels. The level of service can be increased by aligning logistics and e-commerce, as the customer will have a larger range of products, and orders can be simplified and tracked.

Other impacts include a decrease in the parameters of the quantity of goods per order unit (value of goods, size of shipments), an increase in cyclical delivery frequency, and, based on market information, a 10-15% reduction of one-off freight rates. Of course, the reduction in freight rates can be influenced by other factors (reduced fuel prices, increasing competition, etc.), but the above impacts have also triggered a negative spiral in the management of logistics service providers. The best business barometers for logistics service providers are the availability of shipping data for the following quarter published by international shipping companies and the take-up prices (freight rates) for the future period which are based on these indicators, among other things. A significant proportion of the flow of goods between continents takes place in containers. The survey mentioned by Simon [2000] found that the volume of international container transport increased by 10.8% per year between 2000 and 2005, and that further growth is expected in the medium to long term. In a balanced economic environment, the number of containers shipped worldwide doubles every 7 years. This container capacity growth trend will have a significant impact on the logistics market and will be a challenge for the operation of logistics systems.

Today, many leading companies are offering an integration of services with their core products which comprises a significant shift in their underlying business models. So, while studies demonstrate that servitization creates value on the level of the product directly acquired by the customer, value acquisition by the product-service provider is subject to debate [Kastalli, Van Looy 2013]. That is, servitization is the transition process of an organization that continuously innovates new services and added values with its core product, which in the end marks a firm as a value provider and leads to better success [Ahamed 2013]. The study by Lee et al. [2016] reveals that the servitization strategy is a better choice for a manufacturer selling physical goods only when the goods require a higher level of service (i.e., have a high service dependency), and when the competition between the two channels is more severe (i.e., high channel substitutability).

As the economic environment has changed, the servitization strategy has recently been implemented in a context in which big data plays a significant role [Opresnik, Taisch 2015].

The results of [Bustinza et al. 2015] also show that increasing differentiation and high customer satisfaction are fundamental to achieving competitive advantage and superior performance with services.

## **SOCIAL AND POLITICAL PROBLEMS AND NATURAL DISASTERS**

According to a survey by aid organizations, two thirds of agricultural products produced in African countries do not reach the impoverished population for logistical reasons. This fact is depressing because the logistics system cannot solve its task in the environment where it is most needed. Because of their hopeless prospects the population of impoverished African countries is heading towards the more developed continents, in the pursuit of better chances of survival, for example, in Europe. The major wave of migration - in the first quarter of 2015, 200,000 migrants entered the European Union - presents organizations in border countries with significant challenges. This may change in the future, as the European Union proposes to share the problem and burden among the member states [Europa.eu, 2015]. Regarding several aspects of migration, the most relevant research directions and dilemmas, security policy, legal and human rights aspects, current trends and their impacts should be highlighted. The global migration trends will give big challenges for the developed economies [Oláh et al 2017b].

If this proposal is adopted, each member state faces new challenges and thus new logistical challenges. The frequency of natural disasters and the outbreak of local wars have a significant impact on the environment and the economy [Taleb 2012].

Ignoring environmental pollution and sustainable development leads to ongoing

natural disasters (tsunamis, earthquakes, volcanic eruptions). In addition to the logistical challenges of post-disaster recovery work, organisations operating logistics processes encounter two major problems. The first is the designation of new alternative supply routes, which requires immediate action from market participants, and the second is the intensification of the “pull-out” tendency of companies to reduce the risk of their activities and supply chains, resulting in the return of outsourced production to safer regions of the world, for example, from the Far East back to Europe. The most widespread practice in the period prior to disasters was that low-value and repetitive production processes were deployed primarily to developing and/or Far Eastern countries, while high-value-added activities were kept close to the final consumer in the supply chain [Mudambi 2008].

The political and economic separation of production and services can be observed in connection with domestic access to and ability to use European Union funds in the 2014-2020 economic cycle [Torma 2015]. In fact, in the process of producing and selling a product, the line separating production and services can be placed in front of or behind a variety of locations and activities which change periodically. The effect of the dynamics of the economic environment can be observed in the reorganization and restoration of companies' manufacturing, production and service activities, thus the chains of these activities which are formed during value creation are almost inseparable and closely based on each other.

Furthermore, without horizontal support activities, co-operation between activities is unthinkable. As a result of the above, we can see that meeting complex and rapidly changing consumer demands is impossible without close collaboration between production, service and logistics. Logistics combines the components of the value creation process in this functional triangle [Oláh et al. 2017c]. Collaboration among partners of a supply chain strengthens long-term relationships based on personal trust, bringing benefits such as the joint creation of knowledge, sharing expertise and understanding the intentions of the partner, reducing logistics costs, and creating values for

a supply chain [Fawlet et al. 2012; Hong, Dobrzykowski 2012].

## **CONSUMER HABITS AND CHANGES IN SUPPLY CHAIN STRATEGIES**

In a traditional case, the supply chain is examined so that it can be made more cost-effective, and faster, and so that its performance can be increased. However, according to Hau's [2004] observations, these objectives are mistaken and do not lead to competitive advantage. It is therefore important that in order to retain its leading position a company regularly reviews its supply chain and also has action plans that can help it deal with unexpected events. The supply chains of outstandingly large companies have the following features: firstly, they are agile. They respond swiftly to sudden changes in demand or supply. Secondly, they adapt to the way market structures and strategies evolve. Thirdly, they coordinate the interests of all the companies involved, so that when companies maximize their interests, they also optimize the chain's performance. Only agile, adaptable and coordinated supply chains will give their companies a sustainable advantage.

However, the vulnerability of supply chains has increased in recent years. This is not only due to the influence of external events, such as natural disasters, but also to changes in business strategies [Christopher 2004].

To increase market share, companies pay close attention to retaining existing buyers and luring new buyers. According to Stalk [1988], steps towards market expansion are dominated by compliance with consumer demands and expectations, so high quality customer service has been given priority over the past few years.

The purchasing habits of today's consumers differ significantly from those experienced in the previous period. With the spread of the Internet and changing consumer behaviour, customer expectations regarding time are increasingly emphasized. Accelerated lives require faster supply chains and thus require



logistics solutions that support the timely arrival of products/services. Supply chains have introduced several new strategies to meet these expectations [Szegeci 2012]. Amongst the strategies, the best solution is to use delayed differentiation, in which the final product can even be created directly at the point of sale, taking into account customers' expectations of time and quality. Returning to the practice of delayed supply chains, standard cargo shipments are currently a simple logistical task, but the rapid delivery of parts and accessories to sales points already presents significant challenges for logistics service providers. Within the supply chain, only by using a variety of solutions can a smooth flow of goods be managed, and the expected logistical solutions and their application continues to be determined by the benefits and disadvantages experienced by member companies. A company's position on the market is largely determined by its competitiveness, customer focus, flexibility, and its role in supply networks [Takács-György, Toyserkan 2014]. The competitiveness of supply chains is determined by the quality of customer service, whose two decisive factors are coordination and integration [Stadtler, Kilger 2008]. The organization and implementation of supply chain members should be carried out in such a way that both economies of scale (cost-effective bridging of large geographical distances) and economies of choice (offering tailored services) can be realised simultaneously by members of the supply chain [Bowen, Leinbach 2004].

Other prerequisites for flexible supply chains are virtualization and network-based collaboration between the partners involved. Today, among other considerations, the main focus is on the spread of cloud-based technologies with mobile applications and the standardized Electronic Data Exchange (EDI) between Enterprise Resource Planning System (ERP) in all areas that can either be easily algorithmized or where manual inputting can lead to errors.

Another challenge for the future is the so-called "glocalisation". In the freight transport system, the effect of the glocalisation is expected to increase as the establishment of

logistic centres will lead to an increase in the role of local and regional production and distribution organizations. Logistical centres form a hierarchically structured regional network, which is also linked to the great European and world systems. Traffic between the centres can be dominated by rail and water transport, while in areas supplying the centres the dominant role is played by road transport [Tánczos, Bokor 2006]. The competition between logistics service providers will continue to grow in the future.

However, it should not be forgotten that supply networks in the business environment do not always benefit from too close links. The importance of trust in organizations is increasingly recognized [Lapointe et al. 2014]. In any analysis of relationships between organizations an examination of the issue of trust and opportunism is of particular importance [Galaskiewicz 2011]. The question of trust - in relation to supply networks - was initiated some time ago. Relationships between individuals and/or organizations are based on trust, which also reduces risks. Network structures help and speed up the building of trust and help the flow of information between actors. Thus, effective information flows within and across organisations are essential to manage supply chains, and such SCM operations cannot be possible without information system management [Tatoglu et al. 2016].

Trust was found to be a crucial factor that affects supply chain collaboration [Kelle, Akbulut 2015]. Three aspects of a supply chain network influence network-level trust in supply chains: the number of uninfluenced partners, the number of uninfluential partners and the degree of interdependence [Capaldo, Giannoccaro 2005]. According to the relational view, collaborative strategies require trust-based mutual commitments to co-create value [Day et al. 2013]. Wang [2012] pointed out that business partners today no longer only emphasize the importance of trust building, because there is no doubt that the prerequisite of building trust is becoming an inevitable common understanding in business.

The most successful network strategy is when the weak and strong relationships

in a given supply network emerge carefully and at the same pace. Close relationships ensure players/partners' loyalty, while weak links provide access to new ideas, innovations and alternatives, often on more favourable terms than if there were only strong relationships in the network.

The logistics solutions which follow the overlapping relationships of the member companies in a supply chain are created with the intent of meeting customer expectations. In today's market economy no-one can question the importance of meeting customer expectations. Management of companies committed to unbroken development thus involves a constant analysis of which factors determine the company's performance as it is perceived by the customers, and what priority they should be given. At the end of the 1980s, the cost, quality, reliability and timeliness of the service were the accepted order [Evans 1991]. As a result of accelerating technological development, the significance of time factors has increased [Kalló 2010, Chikán, Demeter 2001] and so leading companies have started to differentiate themselves from their competitors on the basis of cost and quality.

## **INFORMATION TECHNOLOGY DEVELOPMENTS AND REVOLUTIONARY NEW, INNOVATIVE TECHNOLOGIES**

In the last decades, the e-commerce and Information Technology (IT) have demonstrated great impact on supply chain management (SCM) [Li 2007]. To improve global supply chain integrity, the effective use of information technology and IT infrastructure has become one of the central topics in relevant areas [Li, Warfield 2011]. Key enabling ICT (Information and Communications Technology) technologies include radio frequency identification (RFID), wireless sensor network (WSN), machine-to-machine communication (M2M), human machine interaction (HMI), middleware, web service, information systems, etc. With multiple visions from different viewpoints, the IoT has become the common paradigm of modern ICT area [Atzori et al. 2010].

The technologies will allow real-time collaborative SCM, supply chain integration, and supply chain quality management in the face of complex and fast-changing market conditions [Xu 2011].

Among the new and innovative technologies which represent a radical change from established processes, are drone technology, which has been involved in a number of advanced experiments around the world in order to provide consumers with a high standard of service. The players in the logistics market are paying close attention to drone experiments, apparently still struggling with the dilemma of whether to adopt an "I'll be part of it and use IT", or an "I'll keep my distance for the time-being" attitude. It is expected that the proliferation of drone technology will fundamentally revamp the business and operational model of businesses operating in the CEP (Courier, Express and Parcel) market, and its introduction will have an impact on the development of new IT methods and also on the role of humans as so far essential contributors to the transit process.

The adoption of advanced information systems in supply chains means sharing and analysing large amounts of data among multiple actors [Urciuoli, Hintsä 2016]. Performance consequences of IT investments continue to be a hot topic in light of the continued development of these technologies and their growing use in global commerce [Sabherwal, Jeyaraj 2015; Chaysin, Daengdej, Tangjitprom 2016]. In order to survive and remain competitive in the global market, one has to manage the future [Patro, Raghunath 2015]. Effective use of the success factors of IT enhances the production, revenue and profit potential of firms. IT investment is positively associated with higher revenue and quality performance. Yu [2015] results show positive direct relationships between IT implementation and three dimensions of supply chain integration, namely internal, customer and supplier integration. The results also suggest that IT-enabled internal integration is significantly and positively related to both operational and financial performance. Another research shows that performance is the most important criterion group, followed

by cost, service, quality assurance, intangible and IT [Hwang et al. 2016].

Oláh et al [2017d] concluded that sector-specific IT investments have a positive impact mainly on the degree of financial success and integration, but not on the flexibility of enterprises. This could also show that sector-specific IT investments improve process effectiveness and service standards, but they do not improve the reactions, that is, the flexibility of the service provider expected by customers. This fact is mostly in connection with the scale of enterprises, as it can be assumed that the enterprises which made sector-specific IT investments are larger than those that did not.

## **SUPPLY CHAIN MANAGEMENT OVER THE INTERNET OF THINGS**

The Internet has emerged as an effective means of driving information integration and sharing for a supply chain, as well as has supported various coordination mechanisms across a supply chain. To make decisions promptly and to accelerate material flows via the integration and sharing of information flows improve the effectiveness and efficiency of a supply chain execution. However there exists a gap between the material flows and the information flows in a supply chain because of the information flows always can not reflect the wave of material flows real-timely, as well as it is impossible to understand the process of a supply chain execution real-timely. Being the next generation network of the Internet, the Internet of Things (IoT), which is a comprehensive extension of the Internet and also can achieve the pervasive connections between objects (things) and objects (things), information automatic collecting and real-time processing, as well as ubiquitous computing, close the gap between objects in the material world and their representation in information systems[Lou, 2011].

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information automatic and real-time collecting, as well as ubiquitous computing, overcome the gap between objects in the material world and their representation in information systems. It is possible to further improve the efficiency and effectiveness of supply chain over the IoT.

## **CONCLUSIONS**

After studying the above sections, we can be sure that the main economic trends will be decisive in our lives in the future. The growth in global goods traffic will have an impact on the dynamic development and topology of logistics networks that connect the world. Changes in consumers' buying habits and new supply chain strategies all affect the distribution processes and solutions employed by service providers.

Servitization creates new opportunities in growing markets, operating as an instrument of differentiation. Servitization also builds barriers to competition as service providers build a deep understanding of customers' experiences and needs and may also accumulate an advantage of scale.

Basically, in real-life business environments the building of trust relationships appears to be impacted by the implementation of every detailed element of business cooperation decision-making during the business development processes.

IT will continue its uninterrupted development, and the spread of revolutionary innovation technologies will have an impact on ever more modern logistics solutions. In addition, timely access, ability, confidentiality, popularity, and robustness also contribute to the secure deployment of supply chains, which enable companies to survive in the longer term. At the same time, when supply chains compete with each other, we must create the opportunity to manage chains across a company boundary. All this requires a serious IT background and IT capability. The effects of legislation introduced by other countries must be expected in the future, and they must be taken into account in the development of the best transit solutions.

IoT is able to real-timely monitor the process of a supply chain execution and also to further improve the efficiency and effectiveness of supply chain.

Based on the inter-connections described above, we can state that it is not only production and manufacturing companies, but also their supply chain, logistical service providers which will still face significant challenges in the future.

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## WYZWANIA PRZYSZŁOŚCI ORAZ OBSZARY ROZWOJOWE W ZARZĄDZANIU ŁAŃCUCHEM DOSTAW

**STRESZCZENIE. Wstęp:** Kierunki przepływów dóbr w skali globalnej oraz rozwój węzłów w sieciach handlowych mają istotny wpływ na rozwój HUB-ów logistycznych. Zmienne procesy ekonomiczne, zachodzące obecnie na świecie, efekt globalizacji oraz G-lokalizacji, oczekiwania klientów i zmiany nawyków zakupowych jak również zróżnicowanie w rozwiązaniach stosowanych w obrębie łańcuchów dostaw mają duży wpływ na pojawianie się i rozprzestrzenianie nowych rozwiązań technologicznych dostaw towarów.

**Wyniki:** Omawiane w pracy zmiany mają istotny wpływ na procesy logistyczne, gdyż dotyczą zmieniających się zadań i wyzwań w zarządzaniu łańcuchem dostaw. W pracy zaprezentowano znaczenie tego wpływu w oparciu o przegląd literatury międzynarodowej. Z początkiem nowego tysiąclecia łańcuchy dostaw stały się coraz bardziej złożone. Zmiany w wielkości oraz strukturze geograficznej przepływów towarowych wymagają ponownego zdefiniowania topologii światowego przepływu dóbr. Prezentując głębszą analizę tych efektów, praca ukazuje wyżej wymienione zagadnienia z różnych perspektyw. Mimo to, trudno w tej chwili ocenić, który z kierunków będzie dominujący i zyska największe znaczenie w przyszłości.

**Wnioski:** Najlepszą odpowiedź na postawione pytanie mogą dać tylko przyszłe wydarzenia, jednak model wpływu zaprezentowany w pracy oraz oszacowanie potencjalnych trendów może pomóc wskazać najbardziej prawdopodobne kierunki. Narzędzia technologii informatycznej będą miały duży wpływ na procesy ekonomiczne oraz szybszy rozwój sieci.

**Słowa kluczowe:** łańcuch dostaw, globalizacja, obsługa klienta, zaufanie, technologie informatyczne, Internet rzeczy.

## ZUKUNFTSHERAUSFORDERUNGEN UND ENTWICKLUNGSBEREICHE IM LIEFERKETTEN-MANAGEMENT

**ZUSAMMENFASSUNG. Einleitung:** Die Ausrichtung von globalen Materialflüssen und die Entwicklung von Knotenpunkten in Handelsnetzen üben einen wesentlichen Einfluss auf die Entfaltung von logistischen HUB-Zentren aus. Die sich verändernden Wirtschaftsprozesse, die heutzutage in der Welt vorkommen, Effekte der Globalisierung und der G-Globalisierung, Kundenerwartungen und Veränderungen innerhalb der Einkaufsgewohnheiten sowie eine weitgehende Differenzierung der innerhalb von Lieferketten angewendeten Lösungen beeinflussen stark die Generierung und Verbreitung neuer Technologie-Lösungen im Bereich Warenlieferungen.

**Ergebnisse:** Die in der Arbeit behandelten Veränderungen beeinflussen wesentlich die Logistikprozesse, denn sie betreffen die sich ständig verändernden Aufgaben und Herausforderungen im Lieferketten-Management. Im Rahmen des vorliegenden Beitrags projizierte man in Anlehnung an die Übersicht der internationalen Fachliteratur die Bedeutung des betreffenden Einflusses. Seit Anfang des neuen Jahrtausends sind die Lieferketten komplizierter geworden. Die Veränderungen im Ausmaß und in der geographischen Struktur von Warenflüssen erfordern eine wiederholte Definierung der Topologie der globalen Warenflüsse. Anhand einer vertieften Analyse dieser Effekte werden hiermit die oben genannten Problemstellungen aus unterschiedlichen Gesichtspunkten projiziert. Trotzdem ist es schwer im Moment zu beurteilen, welche Ausrichtung eine Dominanz erfährt und in Zukunft die größte Bedeutung erlangt.

**Fazit:** Auf die gestellte Frage können zwar die beste Antwort nur die zukünftigen Gegebenheiten geben, allerdings können das in der Arbeit dargestellte Modell und der Versuch der Einschätzung der betreffenden, potenziellen Trends bei der Festlegung der wahrscheinlichen Ausrichtungen behilflich sein. Die IT-Tools werden einen großen Einfluss auf die Wirtschaftsprozesse und auf die schnellere Netzwerk-Entwicklung ausüben.

**Codewörter:** Lieferkette, Globalisierung, Kundenservice, Vertrauen, IT-Technologien, Internet der Dinge

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