

# **A Systematic Review of China's Belt and Road Initiative: Implications for Global Supply Chain Management**

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**Keywords:** *Belt and Road Initiative (BRI); Global Manufacturing; Global Supply Chain; Supply Chain Management; Supply Chain Design.*

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## **Abstract**

China's *Belt and Road Initiative* (BRI) is one of the world's largest infrastructure projects, with its potential political and economic impact being widely discussed since its inception in 2013. Yet the phenomenon has received only limited attention in the Supply Chain Management (SCM) literature. In response, we first conduct a broad systematic review of the literature to assess how China's BRI is portrayed. Using this as a backdrop, we then distill the likely impact of the BRI on location decisions and supply chain flows. Finally, in a broader discussion of the SCM literature, we explore the implications of the BRI for future research in four key areas: supply chain configuration, supply chain resilience, sustainable SCM, and cross border SCM. While these areas are not new, the BRI presents a unique context that can be used to enhance theory and understanding in each area. The BRI reduces time distance independent of geographical distance by diverting supply chain flows from established routes to new routes via far less accessible regions. This introduces new risks and sustainability issues that call for multi-criteria decision support systems. Another important issue is the adoption and diffusion of the BRI since this will ultimately determine project success.

**Keywords:** *Belt and Road Initiative (BRI); Global Manufacturing; Global Supply Chain; Supply Chain Management; Supply Chain Design.*

## 1. Introduction

This paper discusses the likely impact of the *Belt and Road Initiative* (BRI) – one of the largest and most ambitious infrastructure projects currently being undertaken anywhere in the world – on the design and management of supply chains. Although the BRI has received only limited attention in the supply chain management literature to date, it has been widely discussed in other fields. We use a systematic review of this broader literature as a basis for unpacking how the BRI is likely to impact global supply chains and what this means for future supply chain management research.

The BRI was formerly announced by the President of the People’s Republic of China, Xi Jinping, in 2013 as part of his state visit to Kazakhstan and Indonesia (Huang, 2016; Sárvári & Szeidovitz, 2016; Summers, 2016; Chen *et al.*, 2017). The intention of the BRI is to combine the ‘*Silk Road Economic Belt*’, a network of transportation and communication infrastructure through central Asia (the *Belt*, announced in Kazakhstan) with the ‘*21st Century Maritime Silk Road*’, a string of ports connecting China with Southeast Asia, the South Asian subcontinent, Africa, the Middle East, and Europe (the *Road*, announced in Indonesia). Later, in 2015, the Chinese government laid out a vision for realizing the BRI (Ministry of Foreign Affairs, 2015a) and presented the Suzhou Guidelines for cooperation between China and Central and Eastern European Countries (Ministry of Foreign Affairs, 2015b). These guidelines outlined the actions that should be taken in the context of the Silk Road Economic Belt, which can be further divided into two major routes: the Northern route, which starts from Beijing and goes to Russia, Eastern Europe, Germany and eventually to the Scandinavian countries; and the Southern route, which goes to Central Eurasia and ultimately to Hamburg, Paris, London, and Lisbon. Meanwhile, several infrastructure projects were planned that seek to increase the connectivity of ports, thereby linking the Silk Road Economic Belt with the 21<sup>st</sup> Century Maritime Silk Road. Further, at the end of 2015, the Asia Infrastructure Investment Bank was founded as a major means of financing the BRI (Chaisse & Matsushita, 2018).

Since its inception, there has been significant political and financial investment in the BRI. For example, even by as early as 2016, China had issued a joint statement with 56 countries and regional cooperation organizations on the BRI and had signed relevant memorandums of understanding and of agreement. Meanwhile, 38 large-scale transportation infrastructure projects had been carried out by Chinese enterprises in 26 countries on the BRI route, and Beijing had invested a total of US\$ 51.1 billion in countries along the route, equivalent to 12 percent of China’s Foreign Direct Investment (Chongyang Institute for Financial Studies, Renmin University of China, 2016). This puts the significance of the project initiated by China

on a par with the ambition of US policy between the two world wars (Blanchard & Flint, 2017) and with the Marshall plan (Blanchard, 2017). Given the political and financial commitment of the Chinese government to the BRI (Blanchard, 2017; Thuan, 2017), it is likely to have a dramatic effect on the way in which business is done both within China and between China and the rest of the world, with inevitable consequences for global supply chains.

From the above discussion, it is evident that the BRI is a fluid concept that encompasses a variety of projects and approaches. That it is fluid and dynamic should not come as a surprise – after all, it can be argued that the Chinese government initiated the project with a broad goal. However, in deploying this initiative, tangible change can be expected. Regions that have engaged with the BRI and taken part already can attest that it is a reality, backed by Chinese hard currency (Guluzian, 2017). In general, there are several motives that have been put forward to explain the inception of the BRI and the strong commitment of the Chinese government, including: (i) allowing for the internationalization of the Chinese currency (Fung *et al.*, 2018) and the effective use (or re-balancing) of foreign currency reserves (Chaisse & Matsushita, 2018); (ii) gaining greater and more reliable access to resources from (and in) remote regions (Holslag, 2017); (iii) reducing (or making better use of) excess production capacities in China (Holslag, 2017; Chen, 2018); and, (iv) allowing for the development of China's Western provinces (Chaisse & Matsushita, 2018), including gaining control over overpopulation and reducing urbanization pressures in coastal cities (Chen, 2018).

All of the above motives are likely to have a strong impact on the configuration and management of supply chains. In fact, gaining access to resources, reducing excess production capacities, and location decisions for manufacturing units in China's Western provinces are all directly related to supply chain management. Yet, to date, the topic has received extremely limited attention from supply chain management scholars. In general, although China itself has hundreds of expert centers specializing in BRI related problems, most of these are embedded in international law, political science, the economy, and social sciences (Kolosov *et al.*, 2017). Thus, the potential impact of the BRI on supply chain management theory and practice has been largely overlooked. Further, the global significance of the BRI means that this is a topic that warrants greater attention from supply chain management researchers and practitioners both within and outside of China.

In response, we use a systematic review of the broader literature on the BRI to gain a general understanding of its likely impact on the business environment. Using these insights as a backdrop, we then seek to distill what the BRI means for the theory and practice of supply chain management. The BRI is an initiative in its early stages. Like during the early stage of a

theory building process, as described by Handfield & Melnyk (1998), the focus of the researcher is to understand what is going on. Research during these early stages tends to be more exploratory and descriptive; it seeks to understand and to identify the key issues. We first assess the likely impact of the BRI on location decisions, using the framework outlined by Ellram *et al.* (2013), and on supply chain flows. In a discussion of the supply chain management literature, we then identify important future research directions that emerge from the BRI for four key aspects of contemporary supply chain management, i.e. supply chain configuration, supply chain resilience, sustainable supply chain management, and cross border supply chain management.

The remainder of this paper is organized as follows. Section 2 presents the methodology behind our systematic review before the results of this review are presented and discussed in Section 3. An overall discussion of what this means for supply chain management practice and theory is then provided in Section 4. Final conclusions are given in Section 5.

## **2. Methodology – Systematic Review of the Literature**

This paper starts with the following research questions:

1. How is China's BRI portrayed in the broad literature?
2. How will the BRI impact global supply chain management?
3. What does this mean for the supply chain management literature?

We conducted a systematic review of the literature to answer our first research question. A systematic procedure for retrieving and selecting the articles (following, e.g. Tranfield *et al.*, 2003) has been adopted to refrain from personal judgments on the value of a study. The three subsections below outline the approach adopted for sourcing, screening, and analyzing the articles (see subsections 2.1 to 2.3, respectively) before the sample characteristics are summarized in Section 2.4. Using the insights gained as a backdrop we then answer our second and third research questions. That is, the answer to our first research question will ultimately shape this study's response to the second and third research question.

### **2.1 Sourcing the Articles**

We did not use a full-text database (such as EBSCO, Elsevier, ProQuest, Sage, Springer, Taylor & Francis, or Wilson) in a bid to avoid excluding any particular publisher from the search. Rather, we used an abstract and citation database as this provides broad coverage across the different full-text databases. There are, arguably, three major abstract and citation databases: Google Scholar, Scopus, and the Web of Science. We excluded Google Scholar because of its

low data quality, which raises questions about its suitability for research (Meho & Yang, 2007; Mongeon & Paul-Hus, 2016). Meanwhile, Scopus has a broader coverage than the Web of Science, but the latter provides access to older sources. Since we are investigating a recent phenomenon, the access to older sources offered by the Web of Science database is not an advantage. We therefore focused on Scopus. In general, the number of journals in the Web of Science not covered by Scopus is about 5% and the number of Scopus articles not covered by the Web of Science is about 50% (Mongeon & Paul-Hus, 2016).

Our search has been limited to articles published in peer-reviewed international journals to ensure the quality of the sources held in our database. We also recognize that there is a literature on the BRI in the form of books and white papers; however, it was not possible for us to have access to all such books and papers for a systematic review. We acknowledge that, by focusing on peer-reviewed journals articles, we were introducing two potentially important limitations to our study. The first recognizes that because of the lead time associated with peer-reviewed articles, the articles reviewed may not contain the most recent changes to the BRI. Second, we were excluding practitioner-based, non-refereed citations; however, it is more difficult to evaluate the quality of such publications since they do not go through a peer review process. We explicitly recognize these limitations and accept them because of the improved rigor and validity associated with using sources that have been previously reviewed and vetted. Only English sources were included in our review given the language limitations of the author team. Scopus was queried in April 2018 using the following terms: "Belt and Road" OR "One Belt One Road" OR "One Belt" OR "One Road" OR "OBOR" OR "BRI" OR "New Silk Route" OR "New Silk Road". To keep our results to a reasonable number, we restricted our search to the title, abstract, and keywords of papers. The Scopus document type was limited to 'articles' and 'reviews'. No restriction however was applied to the subject area or year of publication. In total, we retrieved 501 articles at this initial sourcing stage.

## **2.2 Screening the Articles**

At the screening stage, articles were included/excluded based on the abstract, which was retrieved from the database. All abstracts of the original sample of 501 articles were read. Any article that focussed on the BRI in an economic/business context was retained. Most of the analysis was executed by two researchers/authors. The abstracts were read by both researchers independently and the results were compared. Any inconsistencies of interpretation were resolved through discussion until consensus was reached. All articles for which no clear decision could be reached were put in a backlog. The backlog was then cleared by both

researchers through in-depth discussion, with a bias towards including the article if there was any doubt. This rather subjective procedure based on judgement was required since literature on the BRI is very broad and covers many different areas. Hence, no specific inclusion/exclusion criteria could be applied beyond whether or not a paper appeared to be incorporating a focus on the BRI in an economic/business context.

This first screening resulted in 302 articles being excluded from our study, leaving 199 articles for further analysis. While the number of papers excluded at this stage is high, it is justified by the inclusion of all subject areas in the original sample. As a result, articles were initially retrieved on tire emissions, traffic accidents, etc. Meanwhile, some papers referred to the competing US initiative put forward by Hilary Clinton in 2011, which aimed to integrate Central Asia with Afghanistan as a connection point (while attempting to bypass Iran). It should also be noted that not all of the 199 remaining papers were available for further detailed review. In spite of the best efforts of the research team, and using several channels to retrieve the articles identified as relevant, only a total of 169 articles (i.e. 85%) could be obtained. To ensure that we did not miss relevant articles, we further cross-checked the reference lists of the 169 articles. This resulted in the identification of a further 4 relevant papers. This approach of organically supplementing the set of articles that had been mechanically retrieved ensured that the list of articles was complete, but the number of articles added (4) was not so great as to suggest that the original search process was inadequate. The final sample of analyzed full papers was thus 173 articles. Note that only the articles that are referred to directly in our review (i.e. in the manuscript text or tables) are listed in the reference list at the end of this paper. A full list of all 173 articles is available as an online supplement to this article.

### **2.3 Analyzing the Articles – Data Extraction and Data Synthesis**

The relatively large sample and the broad topic – BRI – prohibited the detailed coding of texts. Instead, we used a hermeneutic approach (see, e.g. Boell & Cecez-Kecmanovic, 2014). As a template for data collection, a simple two-dimensional matrix was used where, for each paper (row), we asked (column): What part of China's BRI is discussed (i.e. the Maritime Silk Road, the Silk Road Economic Belt, or some other specific part of the initiative)? What aspect is discussed (political science, economic, supply chain management, etc.)? What is the geographical context (i.e. which region of the world is covered)? What does this mean for global supply chain management? What does this mean for the supply chain management literature? What is the industrial context of the paper, including whether it is on services, manufacturing, etc.? What is the research method used in the work? To minimize subjectivity,

results were regularly cross-checked by members of the research team. If an inconsistency occurred, it was resolved through discussion within the team until consensus was reached.

Literature reviews tend to provide a narrative synthesis. Meta-analysis, meta-synthesis or meta-ethnography are either considered different forms of review (e.g. Grant & Booth, 2009) or less suitable for management research (e.g. Tranfield *et al.*, 2003). In general, reviews in a management context are less structured than, for example, reviews in medicine (Tranfield *et al.*, 2003). Our presentation of results therefore takes the form of a narrative synthesis supplemented by simple descriptive quantitative analysis. Before presenting the results, Section 2.4 summarizes the basic sample characteristics.

## **2.4 Sample Characteristics**

Basic sample characteristics for the 173 articles are summarized in Table 1 and Figure 1. Table 1 presents the distribution of journals where the articles have been published. It highlights the multidisciplinary nature of the BRI. The BRI is a topic with wide appeal – it has attracted attention from a broad set of journals from different academic disciplines. Figure 1 presents the distribution of the articles by year of publication. It can be seen that the BRI is a relatively new development (beginning in 2013, with the introduction of this initiative) in which research interest has been rapidly increasing year on year. Other measures, like the distribution of articles per country, author profiles, etc. did not appear relevant to us and are therefore not presented here.

[Take in Table 1 & Figure 1]

## **3. Results – How is China’s BRI reflected in the Broad Literature?**

In answer to our first research question – How is China’s BRI reflected in the broad literature? – Table 2 and Table 3 first present the part of the BRI discussed in each article and the geographical context, respectively. While each aspect may imply a different geographical context, a port that forms part of the Maritime Silk Route may be situated in the same geographical context as a part of the Silk Road Economic Belt. The integration of the Silk Road Economic Belt and the Maritime Silk Route in the context of the BRI relies on this geographical overlap (Chaisse & Matsushita, 2018). Table 2 and Table 3 highlight that most studies do not specify what part of the BRI and what geographical context is considered. Most of the extant literature refers to the BRI as an abstract concept without explicitly defining which part of the BRI is studied or whether the focus is on the BRI in its entirety. Meanwhile, studies that specify a geographical context typically focus on the Silk Route Economic Belt. A possible explanation

for this is that ocean trade is in general global, whereas land trade is in general bound to a particular geographical context (or landmass).

[Take in Table 2 & Table 3]

Table 4 summarizes the major aspect considered in each study. As expected, a broad set of different aspects of the BRI are discussed, but political and economic considerations dominate. These two dominant considerations will be discussed in sections 3.1 and 3.2, respectively. Section 3.3 then reviews the limited number of articles that focus on supply chain management considerations before Section 3.4 explores the remaining contributions.

[Take in Table 4]

### **3.1 Political Aspects of the BRI**

This study identified 70 papers that focused primarily on political aspects of the BRI. All articles present discussions. Most of the studies discuss geopolitical aspects, with some studies being more specific in terms of the country involved, e.g. Russia-China (Wilson, 2016), Turkey-China (Ergenc, 2015) or Europe-China relations (Casarini, 2016; Sheng, 2017). In 38 studies, the BRI merely provides context or is only part of a broader discussion. In the remaining 32 studies however the BRI is the main topic of the paper.

As previously highlighted by Blanchard (2017), there is no clear or consistent narrative in the literature concerning the motivation behind, or related goals of, the BRI. In general, the literature consists of two lines of argument. The first line focusses on collaboration. It emphasizes the need for co-operation, co-creation, joint growth, etc. In contrast, the second line focusses on self-interest, highlighting China's one-sided goals to grow and prosper. In our sample of international academic research, the latter narrative dominates while the former appears to dominate the official, public channels coming from China (Blanchard, 2017). For example, Holslag (2017) argued that China presents the BRI to Europe as an opportunity for mutually beneficial cooperation, featuring openness and free trade prominently in its discourse, while a closer look at secondary documents, plans, and programs reveals that the BRI largely serves China's own strategy of offensive mercantilism.

Like in any business, self-interest cannot be obtained without buy-in from partners. If the BRI is successful, then China's geopolitical influence will increase. But in order for it to be successful, China must first secure co-operation from its international partners, which is one of its biggest contemporary challenges (Ferdinand, 2016). For example, Poland's willingness to support the BRI is likely to have a major impact on the success of the Silk Road Economic

Belt, since it is here that railways coming to Europe from Russia across the northern corridor and from the Balkans across the southern corridor should, from a geographical perspective, be connected (Górski, 2017). Another challenge involves any longstanding political tensions between countries. For example, India recently announced that it would not participate in the BRI due to China's support for Pakistan as part of the China-Pakistan Economic Corridor (see, e.g. Das, 2017; Garlick, 2017b; Hu, 2017; Jacob, 2017). We must also not forget that China is a multi-ethnic country with tensions between ethnic groups, especially in China's Western provinces. Whether and how China resolves these tensions will play an important role in the future of the BRI (Mackerras, 2015).

Finally, the Southern Route of the Silk Road Economic Belt will facilitate access to more remote and less accessible regions of the world in Central Eurasia for international, large firms. These firms will enter a region with an existing 'Silk Road' that is comprised of many local informal small and micro firms (Karrar, 2013; 2016). This may lead to tension if the survival of the local, smaller firms cannot be ensured.

The above highlights that the BRI is likely to change the *status quo*. It fosters new and extends existing co-operations between countries; but it also creates new tensions. This increases risk, which is an argument that is also reflected in the literature on economic aspects of the BRI, as will be discussed next.

### **3.2 Economic Aspects of the BRI**

Only a very general discussion of the BRI is presented in 24 out of 55 economic papers. A further 28 papers use empirical data to undertake some form of modeling. In 19 out of these 28 studies, the BRI is only used to justify the sample selection. There is only one survey paper (O'Trakoun, 2018), which assesses perceptions of China in the Asia-Pacific region, and one field study (Dong & He, 2018), exploring cross-border timber trade from Myanmar (Burma) to China. In 25 of the 53 articles, the BRI is the main topic. Most studies discuss financial investment (specifically investment risk) in the BRI and the potential impact of the BRI on international trade. Three studies focus on currency internationalization (Liu *et al.*, 2017; Zhang *et al.*, 2017c; Fung *et al.*, 2018).

Similar to articles concerned with the political aspect of the BRI, as presented in Section 3.1, discussion papers on economic aspects of the BRI explore the program's intentions and speculate about its likely impact. However, here the focus is on China's Foreign Direct Investment (FDI) and the potential impact of the BRI on growth and trade. We observe a similar dichotomy in economic narratives as observed for political papers, with one stream arguing

that the BRI is mutually beneficial (e.g. Huang, 2016; Yu, 2017a; Zhang, 2017a) while the other stream argues that China benefits the most given development inequalities and China's export surplus, which is likely to increase further as a result of the BRI (Nazarko *et al.*, 2017). Of course, China is investing heavily in the initiative. Hence, it is logical that it would expect to benefit the most. However, in contrast to the political literature, the positive (or mutually beneficial) view of the BRI appears to dominate. Further, O'Trakoun (2018) argued that the increase in FDI flows from China to its Asian neighbors is likely to improve local perceptions of China's influence on the recipient country.

Finally, Chou & Ding (2015) compared the economic development of the Shenzhen and Kashgar Special Economic Zones. Kashgar is the westernmost city in the Xinjiang Uyghur Autonomous Region directly bordering Central and South Asia. The authors questioned whether Shenzhen can serve as a model and were skeptical of whether the BRI, even when resulting in economic growth, could help to resolve existing ethnic tensions. A major issue is how unequal distribution of the benefits and social costs of economic growth via the BRI can be avoided.

### **3.3 Supply Chain Management Aspects of the BRI**

Eleven papers in our sample consider supply chain management, as summarized in Table 5. Analytical modeling is used in 10 out of the 11 supply chain management papers. The one remaining paper presents a survey to assess the willingness of manufacturers to transition to manufacturing servitization (Hsu, 2016), but the BRI is only used as a backdrop to contextualize the study (i.e. it is not the main focus). Only one of the studies actually focuses on the BRI – Chen & Yang (2018), who proposed a model to determine the optimal port cluster of a network, the required port capacities, and zonal manufacturing scale. The authors applied their model to the container ports along the Maritime Silk Route using numerical experiments. All other studies simply use the BRI to contextualize their study – they do not seek to study the phenomenon specifically or seek to address any particular BRI related problem.

[Take in Table 5]

### **3.4 Other Aspects of the BRI**

Below we include articles focusing on an aspect of the BRI other than the above political, economic, and supply chain considerations. Section 3.4.1 covers articles that have primarily focused on legal issues, Section 3.4.2 covers articles that have primarily focused on environmental and social sustainability issues, and Section 3.4.3 covers articles that have

primarily focused on the supply and consumption of natural resources. The latter two are not categorized as economic studies since their main focus is not on the economic impact.

#### *3.4.1 Legal Issues*

There are nine articles that have focused on legal issues connected to the BRI. A general discussion only is provided in eight of these articles while Yu (2017b) used a survey to assess perceptions of the BRI in China's legal service industry. A first stream of literature focuses on bilateral relations. For example, Lingliang (2016) discussed the legal structure of the BRI and how it relates to other forms of bilateral agreement. This article argued that the BRI presents a new model of global governance that is far more than the connotation of a regional economic integration and partnership arrangement. Meanwhile, extensive government-to-government, enterprise-to-government, and enterprise-to-enterprise relations and transactions are likely to provoke disputes (Wang, 2017). In this context, Hu *et al.* (2017) and Wang (2017) examined the existing mechanisms for resolving such disputes that may prove relevant in the context of the BRI or in the post-BRI era, while Zhang (2017c) reviewed China's approach in drafting ISA (Investor-State Arbitration) clauses in the context of the BRI.

Another stream of literature focuses on the legal system in China. For example, Xiao & Yu (2017) explored approaches to improving the international credibility of the Chinese judiciary system while Yu (2017b) discussed China's legal service industry in the context of the BRI. This is an important topic in the context of supply chain management given the importance of legal stability in global supply chains. Finally, Yu & Chang (2018) discussed shipping law and the likely impact of the BRI on adherence to the Rotterdam Rules, which represent the international community's most recent efforts to harmonize the rules governing international contracts of carriage.

#### *3.4.2 Environmental and Social Sustainability Issues*

There are 12 articles focusing on sustainability issues. Solmecke (2017) provided a discussion on the likely environmental impact of the BRI taking into consideration its focus on the construction of new infrastructure and the heavy use of cement. Meanwhile, Howard & Howard (2016) and Chen *et al.* (2017) highlighted the importance of the sustainable management of Central Asia's transboundary water resources, which may be threatened by the BRI. Modeling is used in the remaining nine articles.

One stream of literature focuses on the measurement of environmental performance. For example, Zhou *et al.* (2017) assessed the environmental performance of major industries, analyzing different development policies – maintaining the current status, industrial

restructuring, technological innovation, and developing eco-industrial parks – while Zhao *et al.* (2018) measured the Total Factor Energy Efficiency of 35 BRI countries.

The literature has also raised concerns with the ‘outsourcing’ of polluting primary industries and the resulting environmental degradation (Suocheng *et al.*, 2017). In this context, Zhang *et al.* (2017a) presented a survey of the empirical literature, studying the embodied CO<sub>2</sub> emissions in China’s foreign trade. The authors highlighted great inaccuracies in the current estimation techniques ranging, in 2007, from estimates of CO<sub>2</sub> embodied in China’s exports from 478 metric tons (Mt) to over 3,000 Mt and in China’s imports from 140 Mt to over 1,700 Mt. Resolving these large variations is an important first step in developing carbon trade policies across BRI countries.

### *3.4.3 Supply and Consumption of Natural Resources*

There are nine articles focusing on natural resources. Modeling is used in five articles while the remaining contributions provide a discussion. The articles mainly focus on the provision of primary resources, such as minerals (e.g. Liu *et al.*, 2018; Zhang *et al.*, 2017b) and oil (e.g. Shaikh *et al.*, 2016; Hao *et al.*, 2017), and electricity consumption/supply (Shi *et al.*, 2018). Meanwhile, Garlick (2017a) discussed energy security and co-operation in a China-European context while Yang *et al.* (2018) assessed the potential for energy co-operation between China and Taiwan. To summarize, while the BRI enables widespread access to an enormous area with vast resources, these resources of various kinds need to be further developed, harvested, maintained, and/or distributed.

## **4. Discussion – What Does All this Mean for Supply Chain Management?**

In reviewing the existing body of literature dealing with the BRI, several observations become very evident. First, the existing research is primarily descriptive and aimed at understanding what the BRI is and what its impact will be. Given that the BRI is a relatively new, very comprehensive and broad-based initiative, this state should not come as a surprise. As noted by Handfield & Melnyk (1998), at the early stages of theory building, the focus is on identifying and understanding the phenomenon and identifying its components and major concerns. Second, the focus is on understanding the costs and benefits associated with the BRI. The Chinese government is interested in seeing the BRI accepted. After all, this initiative is perceived as central to the future growth and development of the Chinese economy. However, for this initiative to succeed, there must be “buy-in” or acceptance from China’s partners. For buy-in to occur, the partners must accept the BRI. Often, the justification for this acceptance

(or rejection) is based on economic grounds. Our review has highlighted two different narratives. One camp highlights the cooperative nature of the BRI, with an emphasis on mutual benefits for China and its trading partners along the route. The other stream argues that the BRI is driven by China's own self-interest and that China will benefit the most from its development. Both streams reflect the nature of the broader media coverage typically given to the BRI (Qian, 2018). This study does not aim to settle this discussion; rather we hold that different motives can lead to the same action. For this study, what is important is the overall project that is taking place and its potential significance for supply chain management research and practice.

China has invested a large amount of money in the BRI. As a result, a significant amount of infrastructure has already been built and continues to be built to support the BRI, see, e.g. Das (2017) for a list of investments in Southeast Asia and Chen & Yang (2018) for a list of port projects with Chinese investors. Furthermore, there is a strong political commitment to the program, with the BRI now becoming arguably 'too big to fail' (Thuan, 2017). Thus, there is an infrastructural change taking place, independent from the BRI's motives. This change, in turn, is likely to alter the way in which business is done both within China and between China and the rest of the world. For example, this change may significantly reduce transportation times (Chen, 2018) thus leading to reduced perceived distances. This in turn opens up completely new possibilities in terms of supply chain configurations, i.e. where operations take place, which actors undertake the operations, etc. Firms not taking advantage of these new possibilities may be left behind. But at the same time, there are multiple sources of risk that may caution against taking advantage of these new possibilities. Therefore, the main message emerging from our literature review is that the BRI has the potential to change or disrupt the *status quo*, thereby more than likely increasing the complexity of supply chain decisions. Firms will respond to this change in different ways, and how they respond may ultimately shake up the competitive landscape and define who the winners and losers are in the post-BRI era. The major implications of this change for supply chain management practice and theory will be suggested next in Section 4.1 and 4.2, respectively.

#### **4.1 BRI's Impact on Global Supply Chain Management**

The concept of supply chain management is concerned with the management of a supply chain, which can be defined as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer and back (Mentzer *et al.*, 2001). From this perspective, we can envision a supply chain as consisting of two elements: entities and flows. We will use

these two elements to structure our response to our second research question – How will the BRI impact global supply chain management?

#### *4.1.1 Supply Chain Entities*

A major supply chain management decision in terms of supply chain entities is the location decision, i.e. where the various actors (and operations) in the supply chain are located. In a recent survey on offshoring and reshoring, Ellram *et al.* (2013) distilled a set of eight factors that determine an organization's location decision in a global context: *Input/Product*, which relates to the availability and cost of natural and financial resources; *Cost*, which primarily relates to labor costs; *Labor*, which primarily relates to labor availability; *Logistics*, which relates to the availability and stability of infrastructure, *Supply Chain Interruption Risk*, which relates to potential threats to the stability of the infrastructure; *Strategic Access*, which relates to market, supplier and knowledge access; *Country Risk*, which primarily relates to political uncertainty; and, *Government Trade Policy*, which relates to the impact of government policies such as subsidies and taxation. Table 6 summarizes the likely impact of the outcomes of the BRI on these eight factors based on the insights gained through our literature review.

[Take in Table 6]

We argue that the BRI will have a strong positive effect on Input/Product Factors, Cost, Logistics, and Strategic Access, as all four of these factors are directly related to infrastructure improvement. Yet, at the same time, we argue that there will be higher Country Risks and issues with Government Trade Policies given that the BRI relies on cooperation with several independent countries. Finally, the impact appears less clear when it comes to Supply Chain Interruption Risk since the BRI increases geographical distance but decreases 'perceived' geographical distance (i.e. travel times decrease). On the one hand, the large geographical distance increases the risk of interruption through natural disaster and terrorism whilst, on the other hand, the reduced transportation time actually reduces risk, e.g. in terms of late deliveries. Meanwhile, the improved infrastructure itself is also likely to contribute to reduced interruption risk. Finally, Ellram *et al.* (2013) argued that Labor factors have reduced the attractiveness of East Asia while the attractiveness of the region was also negatively affected by risk perceptions associated with Logistics and Supply Chain Interruption Risk. Although parts of these negative perceptions still resonate today, a substantial element will likely disappear as a result of the BRI, which has the potential to significantly affect supply chain configurations around the globe.

#### *4.1.2 Supply Chain Flows*

A main objective of the BRI is to improve the flow of products. But a question remains concerning whether this is followed by an increase in the flow of services, finances, and/or information. Specifically, the latter is a key requisite for the effective coordination of product/service flows, and thus the management of supply chains. A main outcome of improved product flows is shorter lead times. While the impact of shorter lead times on supply chains is well-studied in the wider literature, the BRI is unique since it: (i) reduces time distance independent of geographical distance; and, (ii) gives access to remote geographical regions instead of improving the speed of an already existing route. Specifically, the latter is a main intention of the BRI in China, which seeks to switch the flow of goods and people away from being “West to East” such that it becomes “East to West”. Meanwhile, although lead times become shorter, increased geographical distance raises new challenges to the management of supply chain flows, such as disruption risks and sustainability issues.

#### **4.2 BRI’s Impact on Supply Chain Management Research**

While there has been significant research interest in the political and economic domain, supply chain management research is arguably underrepresented, given that the BRI is in an infrastructure project that is likely to have implications for logistics and supply chain management. The BRI has the potential to disrupt the *status quo*, deviating trade from traditional routes. This is likely to trigger new research challenges specifically at the initial stage of its deployment. To answer our third and final research question – What does this mean for the supply chain management literature? – the remainder of Section 4 considers the implications for future research with a focus on four key, contemporary aspects of supply chain management. Section 4.2.1 discusses the impact of shorter transportation times on supply chain configurations before Section 4.2.2 considers the impact of the multiple sources of risk on supply chain resilience. Section 4.2.3 focuses on (environmental and social) supply chain sustainability while Section 4.2.4 discusses cross border supply chain management. Finally, Section 4.2.5 unpacks issues related to the actual adoption and diffusion of the BRI, before a summary of the major future research directions resulting from our discussion is presented in Section 4.2.6.

##### *4.2.1 Reduced Transportation Times – Supply Chain Configuration*

A firm that competes internationally must decide how to spread the activities in its value chain within and across countries. The challenge is how to generate the optimal configuration of the

products, manufacturing processes, and supply sources in order to form an effective and efficient supply chain (Huang *et al.*, 2005) that simultaneously takes advantage of location specific resources and limits the adverse effects of geographical dispersion (Stock *et al.*, 2000). For example, when the widely known “front-shop-back-factory” business model is applied to Asia, the headquarters and trading functions are typically located in places like Hong Kong while labor-intensive production is located in the neighboring part of China (Huang *et al.*, 2013). However, increased labor costs in China have recently undermined this business model. The BRI, and its impact on transportation times, is likely to disrupt the balance once again since it will enable access to cheap labor in China’s previously remote Western provinces and in neighboring countries by ‘shrinking’ perceived geographical distances. This is likely to have a knock-on effect for other low-wage economies that have prospered in recent years, e.g. Bangladesh, Cambodia, etc. At the same time, the “front-shop-back-factory” business model could also be used by European countries. For example, in Poland, where railways coming to Europe from Russia across the northern corridor and from the Balkans across the southern corridor should, from a geographical perspective, be connected.

While supply chain configuration is a widely studied topic in the supply chain management literature, the BRI opens up completely new possibilities, which calls for further research. Moreover, the number of criteria that need to be considered is likely to increase with increased risks and sustainability issues, and so too is the complexity of the decision. New techniques are therefore needed to better support firms in these multi-criteria supply chain configuration decisions at both a strategic and an operational level. This includes big data analytics, given the pure scale of the BRI. There is also scope for phenomenological work in the post-BRI era that observes how supply chains adapt over time to the new opportunities and challenges presented by the BRI.

#### *4.2.2 Multiple Sources of Risk – Building Supply Chain Resilience*

In general terms, supply chain resilience is concerned with the ability of supply chains to prepare for and effectively respond to disruptions, potentially becoming stronger or more competitive (Ponomarov & Holcomb, 2009). This is an important issue in ever-longer and more complex supply chains and consequently there is a literature rapidly emerging on supply chain resilience (e.g. Bhamra *et al.*, 2011; Tukamuhabwa *et al.*, 2015). Much of the literature on supply chain resilience has highlighted the strategies that might be adopted to build resilience to disruptions, including proactive and reactive strategies. Amongst these strategies are supply chain network structure (re)design (e.g. Scholten *et al.*, 2014) and building logistics capabilities

(e.g. Ponamarov & Holcomb, 2009). From an infrastructural perspective, the BRI could thus be expected to contribute to establishing more resilient supply chains, such as by increasing the quality and dependability of the logistics infrastructure. Moreover, it may enable other strategies for enhancing resilience that are described in the literature, such as increasing visibility and enabling greater supply chain collaboration through greater connectivity. Future research in the context of the BRI could contribute by providing policy advice on how infrastructure needs to be constructed to provide high resilience to supply chains relying on this infrastructure.

The extant supply chain resilience literature has however generally focused on large-scale supply chain disruptions, such as those caused by catastrophic events like earthquakes, fuel crises, political turmoil, diseases, terrorism, and hurricanes (e.g. Chen *et al.*, 2013; Scholten *et al.*, 2014). There has been little research into how large-scale government initiatives such as the BRI might build or erode resilience, potentially taking into account disruption caused by political factors. The BRI provides an infrastructure that crosses several countries with quite different characteristics and inherent risks (see, e.g. Diener 2015 for Central Eurasia). Moreover, more political tension and instability may emerge from changes in the political *status quo* prompted by the BRI. Another issue is the maintenance of the infrastructure, specifically in remote areas. Supply chain disruptions do not only occur through major unforeseen events, but also result from the slow erosion of physical structure. This erosion may lead to less effective infrastructure or complete disruption (e.g. a bridge collapsing). Hence, further research is required to develop a holistic and balanced view of the impact of the BRI on the resilience of supply chains specifically in the context of the Silk Road Economic Belt.

#### *4.2.3 Need for Sustainability Considerations – Supply Chain Sustainability*

The topic of sustainability has received broad attention in the supply chain management literature. To date, environmental sustainability has received greater attention than the social dimension (Zorzini *et al.*, 2015). Similarly, in our review of the BRI literature, environmental issues played a major role; for example, two of the 11 supply chain management studies focused on green supplier selection (Lin *et al.*, 2017) and eco-efficient supply chain redesign (Zhao *et al.*, 2018). This includes concerns that China will use the BRI to ‘outsource’ polluting primary industries and resulting environmental degradation (Suocheng *et al.*, 2017). Thus, how an infrastructural project on the scale of the BRI can be executed whilst protecting the environment is a major future research challenge. For example, the BRI will shrink distances in terms of time yet the amount of goods that will be transported and the distance that goods

will travel is likely to increase. So how can this be realized without environmental degradation? This issue is further aggravated by the climatic conditions on the Southern Route of the Silk Road Economic Belt, which runs through arid regions where it is more complex to control air pollution.

Social sustainability meanwhile is concerned with aspects of sustainability such as human rights, health and safety, and community initiatives. Much of the limited available literature on social sustainability focuses on the practices organizations might adopt to detect and remediate social problems in their supply chains (Zorzini *et al.*, 2015). The most commonly employed practices for detecting social problems in supply chains are audits against codes of conduct (e.g. Mamic, 2004) and third-party certifications (e.g. Hutchins & Sutherland, 2008). Where problems are uncovered, buyers will often seek to develop the supplier (e.g. Blome *et al.*, 2014), putting a remediation plan in place such as more regular audits and training on the importance of social reform. Buyers may also seek to reward compliant factories with better prices or contracts. Prior studies however have generally been from the buyer firm perspective or the buyer-supplier dyad and they have often been set in the context of developed countries (Huq *et al.*, 2014). The BRI opens up the network of firms and locations across China and Asia thus exposing supply chains to new suppliers that are potentially more remote, immature and lag behind in their development from a sustainability perspective. Consequently, there is a need to expand the extant literature by focusing on transitional economies and on the supplier perspective, including at (less visible) sub-tiers of the supply chain (Wilhelm *et al.*, 2016).

In general, there is an emphasis on the need for greater transparency in supply chains, so buyers and consumers understand the provenance of their products in terms of where (and how) they were made and under what conditions (Hofmann *et al.*, 2018). More research is needed into the relationship between the BRI and supply chain transparency. That is, research is needed into whether the BRI enables transparency to improve or deteriorate. This is especially important when dealing with suppliers located in geographically remote parts of Central Eurasia or China (e.g. suppliers in China's western provinces) or when dealing with small to medium sized suppliers. In the case of the latter, past research (e.g. Anderson & Russell, 2011) has found that small to medium sized firms fail to comply with such requirements because they are not "capable" of complying. That is, when faced with the opportunities, they may decide to violate one or more dimensions of social sustainability. Further, and as noted by Anderson & Russell (2011: 42), small to medium sized enterprises fail to comply because they often lack the "expertise, knowledge, and resources" to become compliant. This issue becomes even more relevant in the context of transitional economies. A major factor determining the sustainability

of the BRI is likely to be whether or not local firms, which currently form a large part of the existing economy, can take advantage of the new opportunities or whether they are left behind. Local suppliers need support in facing up to the new global challenges.

#### *4.2.4 Global Multi-Country Context – Cross Border Supply Chain Management*

One of the most important aspects that makes a global or international supply chain, which is an inherent characteristic of the BRI, unique is the need to manage the border crossing (Davis & Friske, 2013). However, while there exists literature that refers to ‘cross border supply chain management’, there are only a few studies that have focused on the management of the actual cross border process (e.g. Hausman *et al.*, 2015). This research concentrates on large firms, well-known third-party logistics providers, and the U.S. border. Thus, more literature is needed to explore cross border processes, specifically for smaller firms in less developed economies, including central Asian countries or firms in the Western provinces of China, that cannot rely on external support such as from third-party logistics providers. While the BRI will attract and foster the development of larger enterprises, a Silk Road already exists that is driven by many small, informal businesses (Karrar, 2013; 2016). A major future research challenge therefore is how to enable these businesses to take advantage of the BRI.

#### *4.2.5 Research into the Deployment of the BRI*

A final line of research should focus on the process by which firms within the supply chain accept or reject the changes brought about by the BRI. One way of thinking about the BRI is to regard it as a form of infrastructural innovation – something that changes supply chain flows and consequently may require different techniques for managing these flows. When viewed from this “innovation” perspective, the BRI introduces a number of potentially interesting research questions, such as: (1) What factors influence the adoption and diffusion of the new infrastructure provided by the BRI?; (2) What factors influence the timing of the adoption decision?; and, (3) To what extent is the decision to adopt the BRI viewed as an economic opportunity or as a cost of doing business?

Central to the first question are the issues of adoption and diffusion. As discussed by Abrahamson & Rosenkopf (1993), adoption is an individual decision while diffusion is a social or group decision. With this first line of research, we are interested in determining to what extent is the decision to adopt the BRI influenced by individual considerations or by the actions of others in the industry.

With the second question, we explore the timing of the adoption. Beginning with Westphal *et al.* (1997), researchers have noted that there is a difference between early adopters and late

adopters. This second question is important for several reasons. First, there is the question of motivation – what drives early adopters to be the first ones to “buy” into this new initiative. Are these issues economically driven or influenced by other factors? Second, the actions of early adopters can significantly influence diffusion or the spread of the innovation. As noted by Giachetti & Lampel (2010), when innovations are well understood, the decision to adopt is typically influenced by the actions of others in the industry. However, when innovations are new or seen as radically different from what has been done in the past, the decision to adopt is influenced by the actions of the market leaders. Under such conditions, it can be argued that the Chinese government might target “customers” who are market leaders and attempt to influence their decisions to be early adopters (knowing that these actions might influence the actions of others). With this perspective, research can begin to study the process of diffusion and the role played by various actors in this process.

The final question introduces the issue of the theoretical lens through which we should view the adoption/diffusion process. If this decision is based primarily on economic costs and benefits, then the focus of future research is on the identification and quantification of the costs and benefits associated with the BRI. Alternatively, if the BRI is viewed as a cost of doing business, then we need to change the theoretical lens – from an economically based one to one that reflects issues such as institutional pressures. With this latter framing, we should study the BRI through the neo-institutional theoretical framework as proposed by e.g. DiMaggio & Powell (1983) and Scott (2014). The neo-institutional theoretical framework focuses on how the three forces – coercive, mimetic and normative pressures – bring about conformity (isomorphism) with the new system. While widely used in business research, neo-institutional theory has seen limited usage in supply chain research.

#### *4.2.6 Summary of Future Research Directions in the Context of the BRI.*

The main research directions resulting from the discussion presented in Section 4.2.1 to 4.2.5 above are summarized in Table 7. Table 7 does not intend to provide a comprehensive research program – outlining such a research program is in our opinion not feasible for one author team or one paper given the sheer size and scope of the BRI. Rather, we seek to highlight what we perceive as being important research issues in five key areas. This demonstrates the potential of these areas, demonstrates the role of the supply chain management community in responding to the opportunities and challenges brought about by the BRI, and provides a starting point for future research.

[Take in Table 7]

Table 7 highlights that the BRI is of interest to four key, contemporary aspects of supply chain management: supply chain configuration, supply chain resilience, supply chain sustainability, and cross border supply chain management. The BRI creates access to a part of the world that to date has, economically, been widely neglected given restricted access to its natural and human resources. Further, how to create sustainable and resilient supply chains that connect advanced economies with developing and transitional economies underpins many of the questions summarized in the table. Meanwhile, the scale of the BRI calls for more advanced techniques to support multi-criteria supply chain configuration decisions, including data analytics, and the use of multiple methods. The most important research issue is however arguably the need for more empirical work. Our systematic review of the wider literature, which was used as a backdrop in our study, revealed that the literature on the BRI is very scattered. Most of the extant literature uses BRI only as a context for work on another topic, and most prior work is not empirical. Thus, very little is known about the expected or actual operational impact of the BRI. The BRI is a unique phenomenon of our time, worthy of observation and empirical study in its own right. This includes research on the adoption and the diffusion of the changes brought about by the BRI. The opportunities and challenges of this major international infrastructure project are likely to be quite different to those encountered when embarking on smaller infrastructural initiatives within a single country. Thus, research is first needed, for example, to identify the BRI-specific problems before research aimed at solving these problems can be initiated. This then may provide important insights for other large international infrastructure projects.

## **5. Conclusions**

China's Belt and Road Initiative (BRI) is one of the world's largest infrastructure projects, mirroring in many aspects US policy ambitions between the two world wars and the Marshall Plan. In response to our first research question – How is China's BRI portrayed in the broad literature? – our systematic review of the literature highlighted opposing narratives on the intentions behind the BRI, but what is universally agreed upon is that there is a major transformation taking place. Yet despite the potential importance of this transformation, it remains largely ignored in the supply chain management literature. This is considered a major shortcoming. The main message emerging from our literature review is that the BRI is likely to change or disrupt the *status quo* significantly, increasing the complexity of supply chain decisions. Firms will respond to this change in different ways, and how they respond may

ultimately shake up the competitive landscape and define who the winners and losers are in the post-BRI era.

In response to our second research question – How will the BRI impact global supply chain management? – we mapped the BRI’s likely impact on the management of supply chains in terms of an organization’s manufacturing location decisions and supply chain flows. This mapping led to our third (and final) research question: What does this mean for the supply chain management literature? Focusing on four contemporary supply chain management issues we have argued, for example, that the reduced transportation time that results from the BRI will significantly impact the possibilities for supply chain configurations by increasing the “back-factory” possibilities of the “front-shop-back-factory” business model while opening up new options for the “front-shop” location. At the same time, multiple, diverse sources of risk are introduced, which calls for more research on supply chain resilience. Similarly, sustainability considerations gain in prominence, which calls for more research into supply chain sustainability. Finally, challenges in cross border trade specifically for smaller firms in transitional economies also require further research attention. While none of these research issues are particularly new in themselves, the BRI provides a unique context that warrants attention in its own right. Further, the BRI context can be used to enhance theory and understanding in each of these four topical research areas. The BRI facilitates global supply chains by reducing time distance independent of geographical distance. It does so by diverting supply chain flows from standard routes to new routes that run through more remote and less accessible regions of the world about which far less is known. These regions are not deserts – there exists a plethora of small informal businesses. How to realize the BRI without destroying these businesses is a major future research challenge. Another important research issue in this context is the adoption and diffusion of the BRI as an infrastructural innovation. In the end, the success of the initiative will be determined by the actual use of the new infrastructure, and thus its potential to disrupt the *status quo*.

A first limitation of our study is the use of only one database. While Scopus arguably provides the best balance between accuracy and coverage, other databases, including full text databases, could have been used to provide a more comprehensive picture of the literature on the BRI. A second shortcoming is the restriction of our sample to articles published in English. This is a limitation since the BRI is a project of the Chinese government, and neglecting original sources may mean that important recent developments are overlooked. Further research that is able to incorporate original Chinese language sources is therefore needed to better illuminate the BRI for an international audience.

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*Table 1: Summary of Basic Sample Characteristics – Journals Publishing the Articles*

Journal	Number of articles
China and World Economy	8 (4.62%)
China Report	7 (4.04%)
Croatian International Relations Review	7 (4.04%)
Sustainability (Switzerland)	6 (3.46%)
Chinese Journal of Comparative Law	5 (2.89%)
Baltic Journal of European Studies	4 (2.31%)
International Affairs	4 (2.31%)
Journal of Chinese Economic and Business Studies	4 (2.31%)
East Asia	4 (2.31%)
Geography, Environment, Sustainability	4 (2.31%)
International Spectator	3 (1.73%)
Journal of Cleaner Production	3 (1.73%)
China Economic Review	3 (1.73%)
Revista de la Facultad de Ingenieria	3 (1.73%)
Geopolitics	3 (1.73%)
Boletin Tecnico/Technical Bulletin	3 (1.73%)
Environmental Earth Sciences	3 (1.73%)
Journal of Eurasian Studies	2 (1.15%)
Eurasian Geography and Economics	2 (1.15%)
European Transport - Trasporti Europei	2 (1.15%)
Asia Europe Journal	2 (1.15%)
Europe - Asia Studies	2 (1.15%)
Central Asia and the Caucasus	2 (1.15%)
Renewable and Sustainable Energy Reviews	2 (1.15%)
Emerging Markets Finance and Trade	2 (1.15%)
American Foreign Policy Interests	2 (1.15%)
Science of the Total Environment	2 (1.15%)
Global Journal of Emerging Market Economies	2 (1.15%)
Other (one paper per journal)	77 (44.51%)
<b>Total</b>	<b>173 (100%)</b>

*Table 2: The Part of the BRI Discussed in the Articles*

Part of the Belt Road Initiative Discussed	Number of Articles
All	35
Silk Road Economic Belt	30
Maritime Silk Route	12
not clear	96

*Table 3: Geographical Context of Study*

Geographical Context of the Study	Number of Articles
Global	66
China	33
Central Asia	25
Europe	20
South East Asia	8
Russia	7
India	3
Taiwan	3
Pacific Ocean and Australia	2
Not clearly specified	6

*Table 4: Summary of Aspects Discussed*

Aspect Discussed	Number of Articles
Political science	70
Economical	55
Supply chain management	11
Environmental issues	12
Legal	9
Supply and Consumption of Natural Resources	5
Energy	4
Infrastructure	4
Other	3

Table 5: Summary of Supply Chain Management Literature in the Context of the BRI

Article	Content
Hsu (2016)	The study proposes issues related to innovative product development models with suggestions for its application and manufacturing servitization value.
Bao & Ma (2017)	The paper discusses the quantity decision by considering product quality in parallel supply chains where two manufacturers produce substitute products and then sell them to their downstream retailers separately.
Chen <i>et al.</i> (2017)	The study develops a game-theoretic model to analyze the competition between two container freight transportation modes (shipping and railway) using a competitive game strategic interactions method (deterrence) by taking account of the most cost effective scale of the transportation capacity settings.
Du & Shi (2017)	The paper uses dynamic games of incomplete information to analyze the game behavior between the government and the local companies of the China Railway Express to study whether the government subsidy policy is beneficial to the operation of the latter.
Gallo <i>et al.</i> , 2017	The paper proposes a mixed integer linear programming model to minimize the total energy consumption in cold chains of perishable products.
Lee & Cho, 2017	The paper aims to derive the optimal number of ports in the scenario where ports serve transship and domestic cargos.
Lin <i>et al.</i> (2017)	The paper focuses on developing a novel decision model for green supplier selection in the BRI through a fuzzy weighted average approach with social media.
Zhang (2017b)	The paper proposes an improved logistics path selection algorithm.
Chen & Yang (2018)	The study addresses a port cluster problem that considers industry transfer and the capacity constraints along the Maritime Silk Road.
Ruan <i>et al.</i> (2018)	The study proposes a concept of port service network that consists of a large hub and multiple ports. Ports of small and medium sizes can share their capacities of different types of port service with the hub.
Zhao <i>et al.</i> (2018)	The study redesigns the supply chain of agricultural products in southwest China under the BRI to improve its eco-efficiency by considering the associated agro-wastes flowing into bioenergy enterprises for energy production.

*Table 6: The Expected Impact of the BRI on the Eight Factors that Determine the Location Decision (from Ellram et al., 2013)*

Factor	Expected impact
Input/Product Factors	<ul style="list-style-type: none"> <li>• Increased foreign direct investment and currency stability: The internationalization of the Chinese currency and the effective use (or re-balancing) of foreign currency reserves is one of the main motives for the BRI.</li> <li>• Improved access to primary resources: Infrastructural projects to facilitate access to primary resources make up a substantial part of the BRI.</li> </ul>
Cost	<ul style="list-style-type: none"> <li>• Easier access to (cheap) labor: Reduced transportation time allows for relocating in a larger geographical area providing access to a larger labor pool.</li> </ul>
Labor	<ul style="list-style-type: none"> <li>• Need for human resource development: Access to new labor often means low skilled or poorly qualified labor. A major issue is therefore the development of human resources.</li> </ul>
Logistics	<ul style="list-style-type: none"> <li>• Increased availability and reliability of transportation: Improvement of the infrastructure is a key objective of the BRI.</li> <li>• Reduced transportation time: Reducing the transportation time is a main objective of the BRI.</li> </ul>
Supply Chain Interruption Risk	<ul style="list-style-type: none"> <li>• The risk of disruption by disaster and/or terrorism increases: The BRI potentially extends the supply chain over a larger geographical distance and through several countries.</li> <li>• The risk of disruption by disaster and/or terrorism decreases: The BRI links supply chain partners closer together by reducing the 'perceived' geographical (i.e. time) distance.</li> </ul>
	<ul style="list-style-type: none"> <li>• The risk of disruption decreases through better infrastructure: Increased quality and dependability of the logistics infrastructure decreases supply chain interruption risk.</li> </ul>
Strategic Access	<ul style="list-style-type: none"> <li>• The access to suppliers and markets is increased: The BRI links peripheral countries to developed economies providing new markets and new possibilities for sourcing.</li> </ul>
Country Risk	<ul style="list-style-type: none"> <li>• Increased risk through bilateral relations: Cooperation with one country (for example Pakistan) may increase tension with another country (for example India) disturbing the status quo. This in turn may significantly affect the supply chain since sourcing, manufacturing and access to a market may become easier for the former but almost impossible for the latter.</li> <li>• Different degrees of investment risk: There are significant discrepancies in the development of BRI countries and investment risk. These different degrees of risk need to be carefully considered when designing the supply chain.</li> <li>• Risk through legal insecurity: Extensive government-to-government, enterprise-to-government, and enterprise-to-enterprise relations and transactions are likely to spur disputes. However, bilateral dispute settlement mechanisms are scarce and the legal systems within BRI countries is sometimes not easily accessible. This leads to further risk.</li> <li>• Need for sustainability considerations: A major concern is the 'outsourcing' of highly polluting and dangerous industries to countries with less strict environmental regulations. This would have a direct detrimental effect on overall supply chain sustainability.</li> </ul>
Government Trade Policies	<ul style="list-style-type: none"> <li>• Different taxation and custom rules: At this stage there are no free trade agreements. Hence, taxation and customs play major roles in supply chain costs. There are also no clear rules governing international contracts for carriage across BRI countries.</li> </ul>

*Table 7: Major Supply Chain Management Research Issues in the Context of the BRI*

Topic	Supply Chain Management Research Directions
Supply Chain Configuration	<ul style="list-style-type: none"> <li>• Observe how supply chains adapt over time to the new opportunities and challenges presented by the BRI.</li> <li>• Develop decision support systems that can handle a broad set of different suppliers within a global context.</li> <li>• Develop big data analytics that is able to handle the large amount of data potentially created by the scale of the BRI.</li> </ul>
Supply Chain Resilience	<ul style="list-style-type: none"> <li>• Conduct empirical research into supply chain resilience, specifically in transitional economies.</li> <li>• Develop means for assessing the risk of supply chain disruption (across multiple and diverse sources of risk).</li> <li>• Establish how infrastructure should be designed to provide high resilience to supply chains.</li> <li>• Establish maintenance plans for infrastructure in remote areas.</li> </ul>
Supply Chain Sustainability	<ul style="list-style-type: none"> <li>• Establish how the social dimension of sustainability can be realized in less developed economies.</li> <li>• Expand the extant literature by focusing on transitional economics and on the supplier perspective.</li> <li>• Reduce the impact of transportation on the environment.</li> <li>• Provide policy advice to avoid the 'outsourcing' of polluting industries.</li> <li>• Establish how visibility in global supply chains, as facilitated by the BRI, can be ensured to provide consumers with the transparency they desire.</li> </ul>
Cross border Supply Chain Management	<ul style="list-style-type: none"> <li>• Establish how local businesses in transitional economies (that cannot rely on large, third-party providers) handle cross border trade.</li> <li>• Provide means to support local businesses in transitional economies to cope with the complexities of cross border trade.</li> </ul>
Adoption and Diffusion	<ul style="list-style-type: none"> <li>• Identify the factors that influence the adoption and diffusion of the new infrastructure provided by the BRI.</li> <li>• Identify the factors that influence the timing of the adoption decision.</li> <li>• Establish to what extent the decision to adopt the BRI is viewed as an economic opportunity or as a cost of doing business.</li> </ul>

*Figure 1: Summary of Basic Sample Characteristics – Distribution of Articles per Year (until April 2018)*

