Journal of
International Logistics and Trade

Looking Back to Look Forward: Setting Future Research Agenda for International Business in Textiles and Clothing Industry

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ARTICLE INFO

Article history:
Received 30 October 2018
Revision received 10 March 2019
Accepted 23 March 2019

Keywords:
Trade gravity
Bilateral trade
Textiles and clothing
Trade facilitation

ABSTRACT

Since its development by Tinbergen (1962), the gravity model of international trade has widely been applied to analyse the effect of various factors on trade relationships between countries. Past studies on trade gravity vary not only in the mix of model variables but also in how they have come into the analysis. This study reviews existing literature on bilateral trade with an aim to identify influential predictors such as changes of trade policy and national development strategy and highlight important yet understudied factors such as transport and logistics infrastructure, and sustainable development. To demonstrate the needs to examine these critical factors across industry sectors, the study presents the case of textiles and clothing (T&C) production and trade between China and its trading partners as an illustration. Through the literature review, it shows how the gravity model can be applied to address current issues in international trade arena such as the potential trade war between the US and China, China's Belt and Road Initiative (BRI), and other important factors shaping global T&C trade. This study offers future research directions for analysis of global trade in the T&C industry and contributes to the wider literature of international business and trade.

1. Introduction

Since its development by Tinbergen (1962), the gravity model of international trade has widely been applied to analyse the effect of various factors on trade relationships between countries. The model has been regarded as one of the most widely applied models in empirical research of international trade with more than 11,000 journal articles and more than 1,500 books using 'trade gravity' as key words. One of the advantages of the model is its flexibility allowing for it to be extended to incorporate different factors influential to trade. Identifying the factors that influence trade performance is crucial to ensure firms' survival and expansion (Sousa et al. 2008). The literature on bilateral trade flow presents a diverse number of determinants, where studies have investigated a substantial number of factors for international trading of goods and services across multiple industries at the aggregate (macro) or sectoral (micro) level. There is a need to identify the influential factors and categorise them in a meaningful way to help designing the appropriate mix of gravity model variables.

This study presents a review of the literature on the trade gravity model and factors influential to bilateral trade at

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https://doi.org/10.24006/jilt.2019.17.1.003

both macro (aggregate) and micro (sectoral) levels. The latter is illustrated using a case study of China's textiles and clothing (T&C) manufacturing and trade, given China's role as the world's largest T&C exporter since 1995 (Lau et al. 2017). Global T&C trade in 2017 was valued at US$ 692 billion and US570 billion respectively (Comtrade 2019). In 2017, global trade for all product commodities amounted to US$ 33.9 trillion, and textiles and clothing (T&C) trade occupied 4% of global trade with a value of US$ 1.3 trillion (WITS 2019). The T&C industry is well known for not only its labour intensiveness hence its social economic contributions (Moore et al. 2018) but also being one of the main targets of trade policies especially between the USA and China. It is also one of the most dynamic sectors, where companies constantly look for lower cost manufacturing countries, such as Africa and Southeast Asia, and countries with trade ties with the USA, so as to achieve economies of scales and benefit from higher export profit margins.

To achieve the research objective, we review the literature on international bilateral trade flows from 1962 to 2018 to identify and categorise the key determinants revealed by studies of global trade across industries as well as those specific to T&C trade. Our review shows that factors related to trade policy, which have been examined frequently, are gaining higher relevance against the current economic backdrop which is clouded by the rise of protectionism and trade barriers. An example is Donald Trump's "America First" foreign policy. Past studies have paid inadequate attention on how factors relating to sustainable development are shaping global trade flows. Despite the importance of responsible and green manufacturing in practice, research on global trade flows that specifically address the impact of these factors is limited. This presents a research gap, in particular for studies of trade in labour-intensive and natural resource-intensive industries, of which the T&C industry is considered for illustration purposes due to its social, economic and environment related significance (Henninger et al. 2016).

The rest of the paper is organised as follows. Section 2 reveals the characteristics of the studies under review. Previous studies on bilateral trade facilitation in general are reviewed in Section 3, while studies on T&C trade are examined in Section 4. Section 5 is discussion and conclusions along with research directions for future research.

2. Bilateral trade determinants and facilitation

Many early studies on international trade considered the gravity nature of trade, especially in terms of distance and obstacles to trade between countries, notably Isard and Peck (1954) and Isard (1954) based on the location theory developed by Weber (1911), Lösch (1944) and others, for more details see Elmslie (2018), who argues that the theory behind the gravity model was traced back to the works of Adam Smith (Smith 1776). However, the model was fully completed by Tinbergen (1962), and had been adopted by Poyhonen (1963) and Linneman (1966) who applied the gravity model to estimate the relationship trade between countries. As such this review covers the period from 1962 to the present time.

There is a large body of research on international trade which explore the determinants of export performance, and has uncovered a number of important institutional factors that impact the strategic decisions of exporting and importing firms. For instance, Sousa et al. (2008) reviews the determinants of export performance. Their review of 52 articles between 1998 and 2005 have found that the majority of literature on export performance use multivariate data analysis such as factor analysis, discriminant analysis, multiple regression analysis and structural equation modelling. These studies aimed to explore the relationship between variables that influence export performance using multivariate analysis; in contrast to studies on trade performance which tend to use a gravity model to compare the weight of the influence of determinants of trade flow, and the relevance of other determinants on trade between country pairs (Martinez-Zarzoso 2003). According to Sousa et al. (2008) review, the determinants of export performance can be categorised into internal and external factors. Internal factors included exporting marketing strategy, firm and management characteristics, whilst the external factors included foreign and domestic market characteristics.

Given Sousa et al.'s (2008) extensive review of the effect of microeconomic factors on bilateral trade, this study will mainly focus on macro-economic factors. Economic modelling is a common method used in bilateral trade studies to explore the impact of economic variables on trade flow (Ekanayake et al. 2010). Despite a large number of studies referring to trade gravity have been found as mentioned, only 46 studies of them were conducted using econometrics. Many of them were published in established journals including American Economic Review, Review of Economic and Statistics, and European Journal of Development Research.

The method of analysis adopts Zou and Stan's (1998) vote counting technique to analyse and categorise the number of determinants presented in the literature. This same technique was applied by Sousa et al. (2008) to review determinants for export performance. In this study, the review of gravity trade studies mainly focuses on those studies that apply econometric methods from which common econometric variables can be counted to provide a clearer picture of most frequently used determinants, as well as new determinants, of bilateral trade. Table 1 summarises the descriptive properties of the studies reviewed including the country, industry, period of study and analysis method. As the findings present, the majority of the studies examined the overall trade value from multiple industries.

Table 1. Bilateral trade studies reviewed

Authors	Country of study	Industrial sector	Period of study	Statistical analysis
Tinbergen (1962)	Multiple countries	Multiple industries	1962	GM
Srivastava and Green (1968)	Multiple countries	Raw materials	1977	Regression
Aitken (1973)	Europe	Multiple industries	1951-1967	GM
Pelzman (1977)	Europe	Multiple industries	1954-1970	GM
Brada and Mendez (1983)	Multiple Countries	Multiple industries	1954-1977	GM, regression
Bergstrand (1985)	Europe	Multiple industries	1965-1966; 1975-1976	GM
Thursby and Thursby (1987)	Multiple countries	Multiple industries	1974-1982	GM
Summary (1989)	America	Multiple industries	1978 & 1982	GM
McCallum (1995)	Canada & US	Multiple industries	1988	GM
Frankel et al. (1998)	Multiple countries	Multiple industries	1970-1990	GM
Gould (1998)	North America	Multiple industries	1980-1996	GM
Stone and Jeon (1999)	Asia Pacific	Multiple industries	1987-1993	GM
Martinez-Zarzoso (2003)	Canada	Multiple industries	1980-1999	GM: OLS, panel data estimation
Wilson, Mann, and Otsuki (2003)	APEC	Multiple industries	1989-2000	Interviews, regression, correlation, GM
Lewer and Van Den Berg (2007)	Multiple countries	Multiple industries	1998	GM, regression, sensitivity analysis
Huot and Kakinaka (2007)	Cambodia	Multiple industries	2000-2004	GM
Chan and Au (2007)	China	Textiles	1985-2004	GM
Au and Chan (2008)	EU, America	Clothing	1990-2006	GM
Chan et al. (2008)	India	Textiles	1985-2005	GM with OLS, panel data estimation
Hoekman and Nicita (2008)	Multiple countries	Multiple industries	2000-2006	Gravity regression framework
Tsang and Au (2008)	India	Textile & Clothing	1990-2005	GM, OLS
Akinkugbe (2009)	Africa	Multiple industries	1995-2004	Pooled, cross-country, time series data
Giovannetti and Sanfilippo (2009)	Africa, China	Multiple industries	1995-2005	Augmented GM
Kien (2009)	ASEAN	Multiple industries	1988-2002	GM, Panel data estimation
Au and Chan (2010)	EU, America	Clothing	1990-2006	GM
Portugal-Perez and Wilson (2010)	Multiple countries	Multiple industries	2004-2007	Factor analysis, GM
Chi and Kilduff (2010)	US	Clothing	1995-2006	Gravity Model, OLS
Djankov et al. (2010)	Multiple countries	Textiles; Clothing; Coffee, tea & spices	2001-2003	GM, Questionnaire, conference calls
Ekanayake et al (2010)	ASEAN	Multiple industries	1980-2009	GM, OLS, Sensitivity analysis
Lau and Bilgin (2010)	China	Clothing	1989-2009	GM
Rahman (2010)	Bangladesh	Multiple industries	1972-1999	GM, panel data
Gul and Yasin (2011)	Pakistan	Multiple industries	1981-2005	Augmented GM, panel data
Ullah and Inaba (2012)	Bangladesh	Multiple industries	1992-2009	GM
Sen et al. (2013)	ASEAN	Multiple industries	1994-2006	GM
Chen and Li (2014)	China	Multiple industries	1998-2005	GM, OLS, cross-sectional data estimation
Lee et al. (2014)	OECD countries	Clothing	2005-2007	GM,
Orkan Özer (2014)	Turkey	Textiles	2007-2012	GM
Natos et al (2014)	Cyprus	Agriculture	2004-2012	Augmented GM
Macanas (2015)	ASEAN	Textiles & Clothing	2000-2012	GM
Pietrzak and Lapinska (2015)	EU	Multiple industries	1999-2010	GM
Karamuriro and Karukuza (2015)	Uganda	Multiple industries	1980-2012	GM, panel data,
Kaitbie et al. (2017)	Qatar	Food	2004-2014	GM, cross-section time series data
Lau et al (2017)	China	Textiles & Clothing	1990-2005	GM, Sensitivity analysis
Jean and Bureau (2016)	Multiple countries	Agriculture	1998-2009	Panel data
Abbas and Waheed (2018)	Bahrain	Multiple industries	2000-2016	GM
Chan et al. (2018)	Hong Kong; ASEAN	Textiles & Clothing	2005-2015	GM

Notes: GM: Gravity model, OLS: Ordinary least squares

All the studies reviewed focused on econometric analysis and used the gravity model as a basis for selecting the determinants for bilateral trade. Following the timeline of the research studies, the earliest studies e.g. Srivastava and

Green (1968); Thursby and Thursby (1987), used the conventional gravity model to confirm the magnitude of intra-trade between regions (Ekanayake et al. 2010). These studies explained the export from one country to another through variables such as economic size (GDP or GNP) and distance, as well as, population (e.g. Aitken, 1973; Martinez-Zarzoso, 2003) and per capita income (e.g. Huot and Kakinaka, 2007) to account for the effects on trade flows.

Overtime, the inclusion of other variables concerning trade policies, and in more recent literature, trade facilitation factors have started to appear in the gravity model. It was noted that more studies had considered factors which Sousa et al. (2008) categorised as "external" measures in their review, such as legal and political factors, environmental turbulence, cultural similarity, and export assistance. These external or macro-economic factors are key variables which have been used in most trade performance studies which employ the gravity model.

Interestingly, there appears to be no clear classification of trade flow determinants presented in the literature. Depending on the nature of the study, groups of determinants that were used in the gravity equation could be identified. For example, some studies focused on international trade, examining the impact of trade policies on trade flows (Chi and Kilduff 2010; Tsang and Au 2008; Hoekman and Nicita 2008; Huot and Kakinaka 2007). Consequently, determinants specific to regional blocs and trade policies and agreement were evident. On the other hand, many studies sought to identify the specific determinants of trade facilitation (Martinez-Zarzoso 2003; Portugal-Perez and Wilson 2010; Kien 2009; Akinkugbe 2009), and their impact on trade flow between countries (Chan et al. 2008; Djankov et al. 2010; Lau et al. 2017). From these studies, there is a diversity of determinants ranging from common economic variables, originating from the gravity equation, to geographical, social and trade variables, which have all been applied to examine their impact on trade flow.

Table 2 presents a summary of the categories, determinants and frequency they have been used in previous studies. The findings can be categorised into three broad groups: (1) common determinants, e.g. social, economic and demographic factors, (2) regional blocs, and trade policies/agreements and organisations, and (3) trade facilitation factors. Another additional category for T&C factors was also identified.

Table 2. Summary of determinants in categories

List of determinants	Frequency of use	Percentage
Economic variables		
GDP	31	67.4
GNP	8	17.4
Per capita GDP	13	28.3
Per capita GNP	3	6.52
Exchange rate	18	39.1
Rate of inflation	2	4.35
Consumer Price Index	1	2.17
FDI	1	2.17
Geographical variables		
Population size	18	39.1
Population growth	5	10.9
Distance	38	82.6
Adjacency/Common border	18	39.1
Island/landlocked	6	13.0
Remoteness	2	4.35
Land area	2	4.35
Transport time	1	2.17
Time difference	1	2.17
Social variables		
Common language	18	39.1
Religion	2	4.35
Consumer Price Index	1	2.17
Literacy rate	1	2.17
Political		
Colonial link	5	10.9
Political stability and rights	2	4.35
Trade quantity and price		
Import demand	3	6.52
Export supply	2	4.35
Import quantity	6	13.0
Export quantity	6	13.0
Import price	3	6.52
Export price	1	2.17
Regional blocs		
European Union (EU)	10	21.7
European Economic Community (EEC)	6	13.0
Association of Southeast Eastern Nations (ASEAN)	8	17.4

List of determinants	Frequency of use	Percentage
South Asia Association for Region Cooperation (SAARC)	4	8.70
Asia-Pacific Economic Cooperation (APEC)	2	4.35
Dynamic Asian Economies (DAE)	1	2.17
Caribbean community	2	2.17
Central-American Common Market (CACM)	2	4.35
MASHREK	1	2.17
Economic Community of West African States	1	2.17
Common Market for Eastern and Southern Africa (COMESA)	2	4.35
MERCOSUR	1	2.17
Mediterranean countries	2	4.35
Andean Pact	1	2.17
Latin America Free Trade Area (LAFTA)	1	2.17
Gulf Cooperation Council (GCC)	2	4.35
Middle East	2	4.35
Eastern African Community (EAC)	1	2.17
Regional trade agreements		
North American Free Trade Area (NAFTA)	10	21.7
European Free Trade Association (EFTA)	4	8.70
World Trade Organisation (WTO)	4	8.70
ASEAN Free Trade Area (AFTA)	3	6.52
Economic Cooperation Organisation (ECO) initiative	3	6.52
Caribbean Basin Initiative (CBI)	1	2.17
African Growth and Opportunity Act (AGOA)	1	2.17
Bangkok Agreement (BA)	1	2.17
Everything but Arms (EBA) initiative	1	2.17
North American Treaty Organisation (NATO)	1	2.17
Council of Mutual Economic Assistance (CMEA)	1	2.17
Asia-Pacific Trade Agreement (APTA)	1	2.17
Trade facilitation factors		
Physical infrastructure	5	10.9
Customs environment	6	13.0
Regulatory environment	7	15.2
eBusiness infrastructure	2	4.35
Trade Restrictiveness	4	8.70
ICT	1	2.17
Trade preferential margins	1	2.17
Government Support	2	4.35
Communication networks	1	2.17
Intellectual property rights	1	2.17
Logistic Performance Index (LPI)	1	2.17
T&C variables		
Labour costs	5	10.9
No. of women in workforce	4	8.70
Fashion capital	1	2.17

2.1. Common determinants of bilateral trade

Some of the common determinants of bilateral trade flow used in the majority of studies are those which had developed from the original gravity model. As shown in table 2, these include economic, geographical, social, political and trade quantity & price variables. For economic variables, GDP, per capita GDP, and exchange rate were the most common variables explored in previous research. GDP is associated with the economic development level of a country (Ekanayake et al. 2010). The GDP of an exporting country measures the productive capacity of the nation, whilst the GDP of the importing country represents its purchasing power or absorptive capacity (Chi and Kilduff 2010; Ekanayake et al. 2010). Per capita GDP is an indicator of capital or labour-intensive trade and to express the level of economic development (Chi and Kilduff 2010). Martinez-Zarzoso (2003) evaluated the determinants of bilateral trade flow among 47 countries in the period 1980-1999, and measured the effects of preferential trade agreements between several economic blocs. They identified the trade pattern for different economic blocs within the time period analysed, and showed that different determinants can be used to explain these trade patterns. For example, exporter population explained the growing importance of scaled economies and market-size which affected international trade from 1991 and onwards.

The geographical variables concerned factors related to country population size/growth, distance, time, and common borders. In this category, distance was the most frequently investigated factor. Distance is a variable used to capture transportation costs, for example, Ekanayake et al. (2010) elaborates on factors that could make trading difficult for countries to engage in e.g. time, access to market information and markets. Population size and population growth rate were also common variables studied in bilateral trade studies. The size of a country's population is used to reflect

export/import demand. A larger country is expected to absorb imports better than smaller countries, and experience economies of scales which will give them a comparative advantage in their export industries (Ekanayake et al. 2010).

Other than the common economic and geographical related variables, some studies also included common dummy variables to measure socio-cultural similarity among trade partners, such as common language and historical relationships e.g. colonialism (Ekanayake et al. 2010). These dummy variables are all believed to be significant enablers for bilateral trade (Chi and Kilduff 2010). The findings also revealed a set of variables concerning import and export demand, quantity and price, were used in earlier studies (e.g., Thursby and Thursby 1987; Summary 1989; Gould 1998), but has not been included in later studies. Tsang and Au (2008) and Lau and Bilhin (2010) were the only two recent studies which included these variables, and both these studies had examined bilateral trade for the T&Cs sector.

2.2. Regional bloc, and trade policies, agreements and programmes

The regional blocs examined in the studies reviewed varied from study to study. The findings show investigation of bilateral trade relations with EU and ASEAN countries were the most popular. In addition, variables such as common memberships in a Free Trade Area or trade organisation have frequently been included in the gravity model as factors that can enhance or impede trade between nations. From the studies reviewed, trade agreements with North American Free Trade Area (NAFTA), European Free Trade Association (EFTA),World Trade Organisation (WTO), ASEAN Free Trade Area (AFTA) and the Economic Cooperation Organization (ECO) were also identified to be the most frequently investigated in the literature. For example, Huot and Kakinaka (2007) investigated the impact of trade structure on Cambodia's bilateral trade flow after the country's entry into the AFTA. They modelled several different gravity equations: a basic gravity model, modelling GDP, per capita GDP and distance; and an extended model, which included a regional arrangement dummy, exchange rate volatility, and trade conformity index (TCI). Their study proved their modified gravity model to be effective and applicable in explaining Cambodia's bilateral trade flows, which is dependent on inter-industry trade from factor endowment difference between Cambodia and is trading partners, rather than intra-industry trade from monopolistic competition.

Tsang and Au (2008) examined the impact of North American Free Trade Agreement (NAFTA) on T&C exports from South and Southeast Asian developing countries and the NAFTA member to the US. Determinants such as total production of T&C, total consumption of T&C, labour costs, distance and a regional indicator dummy variable for NAFTA membership were used to measure the trade-enhancing effects of the Free Trade Agreement among member countries. Their results showed that T&C intra trade within the NAFTA could be identified increasing trends in the regional indicator variables in three consecutive intervals from 1990 to 2001.

2.3. Trade facilitation factors

Trade facilitation factors explored in the literature were fragmented and consisted of numerous studies adopting a variety of determinants. Interestingly, the findings showed it was the more recent literatures, e.g. Wilson et al. (2003); Akinkugbe (2009); Hoekmann and Nicita (2008); and Portugal-Perez and Wilson (2010), which have stated to included trade facilitation related factors in the gravity model. Wilson et al. (2003) developed a trade facilitation index (TFI) to measure trade facilitation factors, and argued there are four key areas: port efficiency, customs environment, domestic regulatory environment and the infrastructure to e-business usage. Similarly, Portugal-Perez and Wilson (2010) proposed trade facilitation measures comprise of hard and soft dimensions. The former refers to tangible elements e.g. physical infrastructure such as roads, ports, highways, as well as telecommunication, and the latter concerns transparency, customs management, and business environment. Several studies (e.g. Akinkugbe 2009 and Hoekmann and Nicita 2008) have used Wilson et al.'s (2003) TFI index in their studies, however, as an overall index indicator to represent the four trade facilitation areas highlighted by Wilson et al. (2003). As this study seeks to synthesis the determinants of bilateral trade, Wilson et al.'s (2003) TFI provided a useful basis to categorise trade facilitation determinants which emerged from the literature.

The findings showed that determinants concerning the regulatory environment and customs where the most frequent trade facilitation factors included in bilateral trade studies using gravity modelling. The regulatory environment concerned transparency and stability of environmental regulations, stringency of regulatory standards, compliance with international environmental agreements, and enforcement of environmental regulation (Wilson et al. 20003). Hoekmann and Nicita (2008) outline that the regulatory environment measures an economy's approach to regulation. There are numerous studies which have included one or more variables explaining the influence of the regulatory environment on bilateral trade flow, although there is a lack of methodological consistency across the studies. For example, Portugal-Perez and Wilson (2012) measured the business environment which explains the degree of business friendly environment and regulations of a country, and Chen and Li (2014) included a variable measuring a country's quality of contract enforcement.

The customs determinant concerned factors related to irregular payments, low import fees, hidden import barriers, bribery and corruption. Wilson et al., (2003) and Akinkugbe (2009) included a Corruption Perception Index as a variable in their study. Similar factors have been acknowledged by Hoekmann and Nicita (2008), who refers to these as the cost

factors of trading as they require time and human resource to complete e.g. customs clearance procedures and administrative fees, costs for documents, terminal handling charges.

A number of studies have included a determinant labelled infrastructure in their study (Portugal-Perez and Wilson 2012; Chi and Kilduff 2010) to explain the quality or degree of physical infrastructure. This includes various factors such as roads, port and air transport and transport efficiency. Chi and Kilduff (2010) noted that if a country has a high infrastructure rating, it would indicate a good infrastructure which means higher trade and more export to the country. In Wilson et al.'s (2003) study, they found that port efficiency, port facilities and inland waterways, and air transport, have the largest effect on trade. Improvement in these area can lead to the greatest gains for trade.

Several other trade facilitation factors were also found in the literature that were less frequently explored include e-business environments, ICT, communication networks, government support and intellectual property rights. Hoekmann and Nicita's (2008) study looked at a subset of trade policies that directly affect trade costs associated with administration and entry barriers e.g. tariffs on units (in terms of weight and alcohol content etc.) and non-tariff measures (e.g. quantitative restrictions, technical product regulations etc.). Asides the commonly used determinants of trade flow, Hoekmann and Nicita (2008) included other determinants such as Trade Tariff Restrictiveness Index, non-tariff barriers, Logistic Performance Index, and relative preferential margin. Their results suggest that tariffs and non-tariffs measures continue to be a significant source of trade restrictiveness for low-income countries despite preferential access programs. Reducing the costs associated with trade policies will have a greater payoff than reducing tariffs and non-tariff measures. Moreover, regarding the relative preferential margin, it suggests that measures to improve logistic performance and facilitate trade are likely to have the greatest effects on expanding developing country trade.

The findings summarised in table 2, shows regional blocs and trade policies are widely investigated determinants in the literature. With the current US-China trade war and China's Belt and Road initiative, trade policies will continue to have significant influence on T&C bilateral trade and thus recognition for future research studies. Moreover, trade facilitation factors also warrants further research with increasing emphasis for environmental and social responsibilities from the T&C industry.

3. The case of textiles and clothing sectors

This section provides an insight into the effect of various factors on bilateral trade using the case of the textiles and clothing (T&C) sectors and with reference to China as the world's largest T&C exporting country. Of those studies included in Table 1, thirteen studies (e.g. Chan and Au 2007; Au and Chan 2008; Chan et al. 2008; Tsang and Au 2008; Au and Chan 2010; Chi and Kilduff 2010; Dijankov et al. 2010; Lau and Bilgin 2010; Lau et al. 2017) were found to focus on bilateral trade for the textiles and/or clothing sector.

Studies that considered the determinants of trade for the T&C industry are limited. Many of the studies reviewed were found to explore the determinants of trade flow on international trade performance for different regional blocs, and therefore focusing on multi-industry trade. Thirteen studies were identified from the literature which examined the T&C industry that employed the gravity model (Table 3). The findings for T&C studies, shows that GDP, per capita GDP, distance, population size/growth are the common variables used in the gravity model amongst the common economic variables analysed from the literature in this study.

Table 3. T&C bilateral trade studies

Authors	Variables used in T&C studies
Chan and Au (2007)	GDP, PCGDP, distance, population growth, exchange rate, ASEAN
Au an Chan (2008)	GDP, PDGDP. distance, population growth, exchange rate, labour costs, female, value added, EU, NAFTA
Chan et al. (2008)	GDP, PCGDP, distance, population growth, exchange rate, euro currency, WTO member
Tsang and Au (2008)	Total production, total consumption, labour cost, distance, NAFTA
Au and Chan (2010)	GDP, PCGDP, exchange rate, population growth, distance, labour costs, female, EU, NAFTA,
Chi and Kilduff (2010)	GDP, PCGDP, distance, population, population growth, infrastructure degree, country adjacency, common language, literacy, tariffs, APEC, CBI, NAFTA, WTO
Djankov et al. (2010)	Time, export time, GDP, PCGDP, distance, contiguity, language, colony, landlocked
Lau and Bilgin (2010)	Import quantity, import price, GDP
Lee et al. (2014)	Apparel supply, apparel demand, apparel import, distance, fashion capital
Orkan Özer (2014)	GNP, Population, distance, exchange rate, EU, Muslim country
Macanas (2015)	GDP, population, distance, PCGDP, contiguity, landlocked, island, common language, coloniser, time difference, colony, common religion, AFTA
Lau et al. (2017)	GDP, PCGDP, distance, population, exchange rate, labour costs, female, value added, EU, USA,
Chan et al. (2018)	GDP, PCGDP, distance, population, exchange rate, value added, labour costs, female, LPI

In a study of India's T&C trade, Chan et al. (2008) analyzed the impact of economic factors that underpin India's textiles export, and found that GDP, per capita GDP, population growth rate, and real exchange rate of India's importers

have significant impact on the country's textiles export. Chi and Kilduff (2010) studied the impact of major economic and political factors on US apparel imports from its major trading partners between 1995 and 2006. Their findings showed that growth of GDP and population in the US and its trading partners have been drivers of US apparel import growth, while geographical distance impedes trade. There are also T&C studies which included exchange rate, common language, and common borders as factors that can enhance or impede trade flow. Seven studies had included dummy variables for memberships of FTA or trade organizations, such as NAFTA and WTO. Interestingly, the impact of trade facilitation factors concerning infrastructure, customs or the regulatory environment on trade flow of T&C between countries are near to non-existent. Chi and Kilduff (2010), included specific variables related to infrastructure and tariffs in their study, where they showed that infrastructure development (and literacy rate and language commonality) with the partner country are among the factors pivotal to trade competitiveness. On the other hand, Chan et al.'s (2018) study used the Logistic Performance Index (LPI) as a variable that collectively represented factors related to trade infrastructure.

3.1 Trade policies and T&C trade

Trade policies has regulated global T&C trade since the 1970s. As it is evident from the literature, trade policies or bilateral agreements are among the most influential factors in T&C trade (i.e. Chan and Au, 2007; Chi and Kilduff, 2010; Lau et al., 2017). On the other hand, the global T&C industry has continuously been evolving since the 1970s in terms of production locations. Key factors influencing the change in the industry included high labor costs and trade barriers. From 1974 to 2004, the Multi-fibre arrangement (MFA) and Agreement on Textiles and Clothing (ATC) had seen many relocation activities among T&C manufacturers. Production first migrated from North America and Western Europe to Japan, then to the Asian Big Three: Hong Kong, Taiwan and South Korea. This was due to tariffs imposed on cotton. In 2005, the quota phase-out led to relocation of factories to China and it then became the next T&C production base as labour costs and rents increased in the Asian Big Three countries. In recent years, production migration has been to developing countries such as Malaysia, India, Pakistan and Tunisia.

Interestingly, factors such as cotton tariffs and cost of rent have not been identified as variables used in the gravity model in the studies analysed in this paper. While policy changes with direct impacts on export competitiveness, especially the potential risk of a US-China trade war heightened by the US higher tariffs on Chinese goods and China's response (Churchill and Delaney, 2018), are expected to have a strong impact on T&C trade, this has not been well researched. Thus future research may analyse their influence on T&C trade. Moreover, institutional factors such as non-tariff measures, and environmental and employment regulations, have spurred relocation of some T&C factories in China to other Asian nations (Churchill and Delaney, 2018). China is renowned as the world's largest exporter of T&C (Lau et al., 2017), however, a potential relocation shift for many firms could be foreseeable in the industry's continuous cycle for chasing low-cost labour production. It has been evident in the industry's history, yet relocation proves to be a successful strategy applied by T&C companies in the past to deal with the industry's trade restrictions and protectionism. Whilst the US-China trade war may present potential trade barriers, China's Belt and Road initiative (BRI), established in 2013, could present solutions for T&C manufacturers to relocate production to neighbouring Asian countries, another potential variable to include for future research.

3.2 T&C production, sustainable development and trade

Sustainable development covers not only the economic but also social and environmental factors as the three interrelated components of development. Sustainable development is an important agenda not only in T&C manufacturing and trade, but for other industries; many countries have now considered environmental impacts and management as an important aspect of public and economic policy. Similarly, the social aspect of the T&C labour force cannot be overlooked. However, this has not been well considered in the literature. While existing studies have covered the effect of extensive economic factors, they tend to overlook the social and environmental aspects of T&C manufacturing and trade. Chan and Au (2007), and Lau et al. (2017) used a dummy variable for the number of women in the workforce of foreign manufacturing firms. Although labour cost can apply to all industry-sector analysis, it was not a variable considered in any of the other studies reviewed. Given the growing importance of sustainability practices in the T&C industry, determinants relating to green policies, environmental standards and indexes, factory working standards, or issues surrounding the implementation of CSR in manufacturing firms have not been explored as determinants that could enhance or impede T&C trade. It is evident, that a call for more empirical studies on determining trade facilitation factors for the T&C sector is needed.

It is reported that by 2030, clothing production is expected to increase by 63% (WGSN 2018a) and the production process is always connected with environmental problems (Perry et al. 2014). T&C products have a significant impact on the environment, where manufacturing, using and even deposing these products cause environmental degradation (Khan and Islam 2015). The Natural Resource Defense Council (NRDC 2016) commented that textiles-making is incredibly wasteful and polluting; and is concluded to be one of the most polluting industries in the world (Pedersen and Anderson 2015). This prevailing issue is increasing pressure for better environmental management and environmentally friendly clothing (Zhu et al. 2011). As consumers are gradually changing and becoming more aware of the impacts of T&C

production, and what overconsumption has on the environment, consumers are demanding more sustainable and ethically-sourced products. As a result, T&C companies have to meet higher environmental standards. Some of the strategies put in place include encouraging the recycling of textiles and production leftovers as a way to close the loop on fashion (WGSN 2018b).

As T&C production is highly labour-intensive, it is attractive for factories to be located in developing countries with lower labour costs (Pal et al. 2018; Boström and Micheletti 2016). Since the 1950s, the T&C industry has undergone several structural shifts in manufacturing locations, first starting from North America and Western Europe to Japan in the 1950/60s, then from Japan to Hong Kong, Taiwan and South Korea in the 1970/80s. Another shift in the 1980/90s was from Hong Kong, Taiwan and South Korea to other developing countries e.g. Malaysia, Pakistan and Tunisia. In the 1980s, production partially moved to China, as well as Indonesia, Thailand, Malaysia, the Philippines, and Sir Lanka. The 1990s saw Turkey becoming a major producer of clothing exports, and in the 2000s, the Philippines, Vietnam, Bangladesh, Sri Lanka, Morocco, and four European countries, namely, Czech Republic, Romania, Poland, and Hungry. As environmental and social problems are changing the T&C manufacturing industry, a shift towards more sustainable supply chains is being supported (Henninger et al. 2015). As a result, the pressure for greener supply chains, sustainability and transparency is increasing (Uluskan et al. 2016). In addition, the realisation that T&C manufacturing is no longer just about costs, but also factors such as product quality, human labour rights and the skills of workforce is pushing more and more companies to reshore production back to their home countries (Moore et al. 2018). Pal et al. (2018) note that brands are reshoring T&C production to local and domestic manufacturers, which is something that consumers value (Niinimäki and Hassi 2011).

Asides environmental issues, the social and ethical problems surrounding factory working conditions and standards is another area of concern for T&C manufactures all over the world. Issues concerning compliance with human and labour rights (particularly regarding the economic empowerment of women, and decent work and living wages); and the use of toxic substances in the production of clothes, and its transparency and traceability in the value chain, are the focal issues in a recent Staff Working Document from the European Commission (2017). These concerns can potentially give rise to new regulations and restrictions being approved by the EU, which could affect T&C traders and manufacturers, particularly those operating in international markets.

In the industry, achieving sustainable development in the supply chain is now a key aim of many T&C companies. International retailers such as H&M, have been addressing sustainability issues through the efficient use of materials and natural resources, and reducing the output of toxic substances to the environment (Ho 2014). Some of their sustainable and eco-friendly practices include manufacturing their garments using organic, recycled, biodegradable or recyclable materials; reducing water usage; and using environmentally friendly dyes for example (Ho 2014). It is acknowledged that various processes are implemented by manufacturers across different sectors concerning the reduction of air emissions, water waste, solid waste, and energy consumption (Sivapraksam et al. 2015). In counties like Brazil, de Abreu (2011) highlight that wastewater treatment, electric energy conservation, solid waste management and air pollution controls are all key operational practices implemented in textiles manufacturing. Increased awareness from consumers and demands from international brands ultimately means that including determinants that measures water usage, level of chemical waste and gas emissions can be important indicators for estimating T&C trade flow in future studies. Moreover, the consideration of these factors could help Chinese manufacturers evaluate what is important to consider when building T&C manufacturing firms in foreign countries, given the increased opportunities for Chinese T&C companies to expand manufacturing into foreign countries from the BRI.

Production technology is another trend that is changing the T&C manufacturing landscape. For example, digital technologies enable designers to create individual and unique looks, where consumers' needs are placed at the centre of the design process (Niinimäki 2009; Niinimäki and Hassi 2011). Technologies such as digital printers, embroidery and laser cutting machines, digital weaving machines, and 3D printers all offer an opportunity to meet consumers' needs and preferences, and thereby saving the amount of materials used, or recycling excess materials than compared to traditional manufacturing at an industrial scale (Niinimäki 2009). Advancement of information technology is also contributing changes to the T&C industry. Companies are now utilising the availability of big data for more accurate and efficient logistic and supply chain processes that run in real-time. In retail, radio frequency identification (RFID) technology for example, is enabling all partners to collect real-time data, and visualise sales and predict trends (Kwok and Wu 2010). In T&C supply chain, RFID can be used to streamline the activities in the supply chain, where all partners can exchange data in real-time. This means there can be a reduction in lead time for product replenishment and delivery (Kwok and Wu 2010), and allows the control of material flow in the supply chain. It is evident from the trends in the T&C industry that there are many factors to consider for T&C trade. Including such factors in the future analysis on its effectiveness towards the trade flow could significantly enhance or impede T&C trade between countries.

4. Conclusion and future research directions

This paper reviewed the literature on bilateral trade flow to identify the overall key determinants of trade, and also those specific for the T&C sector. The analysis focused on three key aspects: common economic variables, typically

related to those used in the original gravity equation, variables on regional blocs, and trade policies/agreements and organisations, and variables concerning trade facilitation factors. Interestingly, this review found that determinants that were specific to T&C manufacturing were limited, where only labour cost and the size of female workforce were included in previous trade studies.

Reviewing the literature on determinants for bilateral trade flows revealed some interesting findings. Firstly, there is a need to develop a model that conceptualises the determinants of trade facilitation. Currently, the determinants of trade facilitation is inconsistent and fragmented in the literature. The lack of consistency also makes it difficult to compare findings due to authors using different measures and indexes to account for the same influence on trade. Sousa et al. (2008) concluded similar issues in the literature for identifying determinants of export performance. Secondly, as Sousa et al. (2008) also highlights, there are research opportunities for more industry-specific analysis on bilateral trade flow. Industry-specific analysis could even present more consistent use of determinants to measure bilateral trade, as well as encouraging the inclusion of industry-specific factors to explain the influence on the trade of those goods. Thirdly, trade policies and sustainability have become significant factors in determining the relocation of new T&C manufacturing plant. These factors cover many parameters and it is worthy to ascertain them in the future analysis.

Consequently, the purpose of this paper which aimed to identify trade determinants for the T&C sector, reveals there is a limited number of studies on bilateral trade for T&C trade flow, and hence industry specific factors for T&C trade is underexplored. Future research could include more general trade facilitation factors related to physical infrastructure, customs and regulations into the gravity equation. Research development in this area could contribute further knowledge and help T&C manufacturers identify key determinants that can enhance or impede T&C trade. Further research could also look into industry specific analysis for the T&C sector to examine how some of the fundamental issues such as trade policies and sustainability factors will impact T&C trade.

Acknowledgments

The work described in this paper was fully supported by grants from the Research Grants Council of the Hong Kong Special Administrative Region, China (Project No. UGC/FDS25/B01/17).

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