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A Review of the Determinants of Textile and Clothing Bilateral Trade Flow

W. C. A. Chu
Technological and Higher Education Institute of Hong Kong, Vocational Training Council

M. H. E. Chan
Technological and Higher Education Institute of Hong Kong, Vocational Training Council

J. Cheung
Technological and Higher Education Institute of Hong Kong, Vocational Training Council

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A Review of the determinants of Textile and Clothing bilateral trade flow

Alice Chu[a*], Eve Chan[a], Jenny Cheung[a]

[a] Faculty of Design and Environment, Technological and Higher Education Institute of Hong Kong, Hong Kong, [*] Corresponding author, email address: alice_chu@vtc.edu.hk

Abstract

Past studies have investigated the trade relationship between countries by analysing economic and political related factors using gravity models. Numerous factors have been empirically tested in the literature which are proposed to be important contributors in determining trade flow. This study addresses the research questions, what are the key factors and dimensions that influence bilateral trade. It focuses on identifying the key factors and dimensions for the expansion of Textile and Clothing (T&C) manufacturing by Chinese manufacturers to other countries, in light of China's recent One Belt One Road (OBOR) initiative. This paper will critically review bilateral trade and international business literature that uses the gravity model from 1960 to 2017 to discuss factors previously investigated by researchers. The review reflects on the factors commonly explored in the literature, but also highlights the absence of sustainability factors given the importance of sustainability and CSR issues in today's global T&C industry. This study will contribute to the wider literature of international business and trade, particularly for the expansion of Chinese T&C manufacturing to other countries which are promoted through China's OBOR initiative.

Key Words: One Belt One Road, bilateral trade, textile and clothing, trade facilitation factors

1. Introduction

In 2015, China launched its One-Belt-One-Road (OBOR) imitative, a strategy to promote economic operation between Asia, Europe and Africa. The strategy aims to increase connectivity, facilitates smoother trade flows, and spurs long-term regional economic development in infrastructure, IT, telecom and financial infrastructure that will benefit all those involved. For China's Textile and Clothing (T&C) industry, the OBOR initiative is one that encourages business expansion for Chinese manufacturers to build factories outside of China in countries along two routes: The Silk Road Belt, and 21st Century Maritime Silk Road. Since 1980, China's T&C industry has seen considerable growth due to the country's strong manufacturing outputs and export performance. China is recognised as the world's largest T&C

exporter since 1995 (Lau, Chan and Nguyen, 2017). However, due to increasing costs, in recent years, Chinese manufacturers have moved production to low cost countries in Africa and Southeast Asia. The trend towards globalisation of trade has raised attention in understanding trade performance over recent decades. Having a better understanding of factors that influence trade performance is crucial to ensure firms' survival and expansion (Sousa et al., 2008).

In the literature, numerous studies have empirically analysed factors that are proposed to be important contributors in determining trade flow. Some of the earlier works in the field from Tinbergen (1962), Poyhonen (1963) and Linneman (1966) examined factors affecting the size of trade flows between individual trading countries. Using econometric modelling through a gravity model, a set of economic variables were analysed. Some of these earlier variables include national income, population, and geographical distance. Over the years, authors such as Cheng and Wall (1999) and Egger (2000) have improved the econometric specification of the equation used in the gravity model; whilst others, such as Soloaga and Winter (2000) and Martinez-Zarzoso et al (2006) have further refined the variables used to analyse the impact on trade performance. However, the determinants are diverse where studies have investigated a substantial number of different determinants for international trading across multiple industries. Bilateral trade studies for the T&C is scarce. Consequently, there is a need to synthesise the extent knowledge of determinants for trade, but also to identify those for the T&C sector which may provide useful insight and knowledge for Chinese T&C manufacturers to expand into OBOR countries.

The aim of this study is to identify the determinants trade flow for the T&C sector. To achieve this objective, we review literature on international bilateral trade flows that uses the gravity model from 1960 to 2017 to identify the key determinants previously measured. This study also aims to identify the determinants for T&C trade. This will enable us to review factors that may influence decisions to build manufacturing plants in foreign countries for T&C. Sustainable factors are also examined. This is particularly significant as previous studies do not address their impacts, considering the importance of sustainability and green manufacturing in the industry and the research literature. Lastly, some directions for future research in light in some of the findings are provided. The results are expected to provide useful insight into the determinants of bilateral trade for the T&C industry.

The study is organised into four sections: The first section evaluates previous studies conducted on bilateral trade facilitation. Secondly, determinants of trade flow are analysed and summarised. Thirdly, determinants for T&C industry are reviewed. Finally, discussion and conclusions are presented along with research directions for future research

2. Studies on bilateral trade facilitation

Some of the early studies on international trade flow were from Tinbergen (1962), Poyhonen

(1963), and Linneman (1966), who employed the gravity model to estimate the relationship of trade between countries. The statistics from the model can confirm the magnitude of intra-trade between regions (Ekanayake et al., 2010). The gravity model explains export from one country to another through variables such as economic size (GDP or GNP) and the distance between them. Later studies began including variables such as population and per capita income to account for the effects on trade flows (Kein, 2009). Overtime, there has also been inclusion of other variables concerning trade policies and trade facilitation in the gravity model. The model has been widely used in studies examining international trade between countries.

Another stem of research in the area of trade are studies which explore determinants of export performance. Studies on export performance have uncovered a number of important institutional factors that have an impact on strategic decisions of exporting and importing firms. For instance, Sousa et al. (2008) reviews determinants of export performance. Their review of 52 articles between 1998 and 2005 identified 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 aim 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.'s (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. It was noted that more studies had started to include external measures, such as legal and political factors, environmental turbulence, cultural similarity, and export assistance in their models. Interestingly, these external factors are key variables used in most trade performance studies which employ the gravity model.

A summary of studies on trade performance is presented in Table 1. The majority of the studies reviewed examined the overall trade value at country level, and thus from multiple industries. Six studies (Chan et al., 2008; Tsang and Au, 2008; Chi and Kilduff, 2010; Dijankov et al., 2010; Lau and Bilgin, 2010; Lau et al., 2017) were identified to have included or specifically focused on bilateral trade for the textile and/or clothing sector, and one study (Natos et al., 2014) on agriculture trade.

<div align="center">Table 1. Bilateral trade studies reviewed</div>

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Martinez-Zarzoso (2003)	Evaluate the determinants of bilateral trade flow among 47 countries, particularly the effects of preferential agreements between several economic blocs.	Exporter: Canada Importer: 47 countries in EU, NAFTA, CARICOM, CACM, MEDIT	Multiple industries	1980-1999	Gravity model: OLS, panel data estimation	– Exporter and importer GDP – Exporter and importer population – Distance – Common language – Adjacency – Island – EU Member (dummy) – NAFTA Member (dummy) – CARICOM Member (dummy) – CACM Member (dummy) – MAGREB Member (dummy) – MASHREK Member (dummy)
Wilson, Mann, and Otsuki (2003)	Measured trade facilitation using 4 broad indicators: Port efficiency, customs environment, regulatory environment, and electronic business usage.	Exporter/Importer: APEC countries	Multiple industries	1989-2000	Regression, correlation, Gravity model Conducted interviews, and surveys to generate their indicators.	– Tariff rate – Importer Port infrastructure – Importer Customs environment – Importer Regulatory environment – Importer eBusiness infrastructure – Exporter and importer GNP – Exporter and importer Per capita GNP – Distance – NAFTA Member (dummy) – ASEAN Member (dummy) – English language (dummy) – Chinese language (dummy) – Spanish language (dummy) – Adjacency (dummy)

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Huot and Kakinaka (2007)	Investigated the impact of trade structure on Cambodia's bilateral trade flow after the country's entry into the ASEAN Free Trade Area (AFTA).	Exporter: Cambodia Importer: Malaysia, Singapore, Vietnam, Japan, Korea, Hong Kong, Australia, Belgium, Canada, France, Germany, Ireland, Italy, Netherlands, Spain, Switzerland, UK, USA	Multiple industries	2000-2004	Gravity Model	− Importer GDP − Importer Per capita GDP − Distance − ASEAN Member (dummy) − Exchange rate − Trade Conformity Index
Chan et al. (2008)	Analysed the impact of economic factors that underpin India's textile export.	Exporter: India Importer: USA, United Arab Emirates, UK, Italy, Germany, Bangladesh, Republic of Korea, France, Japan, Hong Kong	Textile	1985-2005	Gravity model with OLS, panel data estimation	− Exporter and importer GDP − Exporter and importer per capita GDP − Population growth rate − Real exchange rate − Euro (dummy) − WTO (dummy)
Hoekman and Nicita (2008)	Analysed new indices of trade restrictiveness and trade facilitation through examining the effects of trade policies on trade costs.	Exporter/ importer: East Asia, EU, Latin America, Middle East, North Africa, South Asia, Sun-Saharan Africa, Australia, Canada, Japan, USA	Multiple industries	2000-2006	Gravity regression framework	− Distance − Exporter and importer GDP − Exporter and importer Population − Exporter and importer Remoteness − Exporter and importer Landlock − Common Border − Common language − Trade Tariff Restrictiveness Index − Non-tariff barriers − Exporter and importer Logistic Performance Index − Import costs − Export costs − Exporter and Importer Trade facilitation − Relative preferential margin

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Tsang and Au (2008)	Examines the impact of North American Free Trade Agreement (NAFTA) on T&C exports from South and Southeast Asian developing countries, and NAFTA member to the USA.	Exporter: India, Indonesia, Thailand, Philippines, Sri Lanka, Pakistan, Bangladesh, Vietnam Canada and Mexico Importer: USA	Textile & Clothing	1990-2005	Gravity Model, OLS	− Exporter Total production of T/A − Importer Total apparent consumption of T/A − Exporter Labour cost − Distance − NAFTA Member (dummy)
Akinkugbe (2009)	Examines why reductions in issues of trade facilitation still continue to discourage exporting.	Exporter/Importer: 20 African countries	Multiple industries	1995-2004	Pooled, cross-country, annual time series data	− Manufactured exports − Real per capita GDP − Taxes on exports − No. of start-up procedures − Aircraft departures − Fixed and mobile phone subscribers per 1000 people − Corruption perception index − Domestic credit to the private sector − International telecoms, outgoing traffic, and ecommerce − Procedures to enforce a contract
Giovannetti and Sanfilippo (2009)	Examined the indirect impact of China on African exports.	Exporter: Africa Importer: USA, EU, Africa	Multiple industries	1995-2005	Augmented Gravity Model	− Exporter and importer GDP growth − Landlock − Distance − AGOA Member − EBA Member − ECOWAS Member − EU Member − COMESA Member

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Kien (2009)	Examines the determinants of export flows of countries in the ASEAN free trade area (AFTA)	Exporter/ Importer: 39 countries, 36 of which are in EU, AFTA, NAFTA, MERCOSUR	Multiple industries	1988-2002	Gravity model, Panel data estimation	− Exporter and importer GDP − Distance − Exporter and importer population − Exporter and importer exchange rate − Language (dummy) − Exporter and importer belongs to Free Trade area (dummy) − Importer belongs to Free Trade area (dummy) − Exporter belongs to Free Trade area (dummy) − Exporter and importer belongs to EU (dummy) − Importer belongs to EU (dummy) − Exporter belongs to EU (dummy) − Exporter and importer belongs to MERCOSUR (dummy) − Importer belongs to MERCOSUR (dummy) − Exporter belongs to MERCOSUR (dummy) − Exporter and importer belongs to NAFTA (dummy) − Importer belongs to NAFTA (dummy) − Exporter belongs to NAFTA (dummy)
Portugal-Perez and Wilson (2010)	Assesses 4 new indicators of trade facilitation on export performance.	101 countries	Multiple industries	2004-2007	Factor analysis, gravity model	− Physical infrastructure − ICT − Border and transport efficiency − Business and regulatory environment

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Chi and Kilduff (2010)	Identify the impact of major economic and political factors on the US apparel imports.	Importer: United States Exporter: China, Hong Kong, Mexico, South Korea, Dominican Republic, Philippines, India, Indonesia, Malaysia, Italy, Thailand, Bangladesh, Sri Lanka, Honduras, Canada	Clothing	1995-2006	Gravity Model, OLS	− Exporter and importer GDP − Exporter and importer Price per capita − Distance − Exporter and importer Population − Exporter and importer Population growth rate − Exporter Infrastructure degree − Country adjacency between exporter and importer (dummy) − Language commonality between exporter and importer (dummy) − Literacy rate of exporter − Tariff imposed on exporters − APEC Member (dummy) − NAFTA Member (dummy) − CBI Member (dummy) − WTO Member (dummy)
Djankov et al. (2010)	Investigated how time delays affect trade.	Exporter/Importer: 98 countries in Andean Community, ASEAN, CACM, CEFTA, CEMAC, COMESA, Commonwealth of Independent States, EAC, ECOWAS, EFTA, ELL FTA, Euro-Med, EU, MERCOSUR, NAFTA, SADC, SAFTA.	Textile; Clothing; Coffee, tea & spices	2001-2003	Gravity Model, Questionnaire, conference calls, survey.	− Ratio time − Ratio export time in neighbours − Ratio GDP − Ratio GDPC − Distance − Language − Contiguity − Colonial linkage − Landlocked − Transit time in neighbours (dummy)

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Ekanayake et al (2010)	Analysed the trade creation and trade diversion effects of regional TRAs in Asia, and their effects on intra-regional trade flows.	Exporter/Importer: ASEAN countries	Multiple industries	1980-2009	Gravity model, OLS, Sensitivity analysis	− Exporter and importer GDP − Exporter and importer Population − Distance − Relative factor endowment − Similarity index − Share the same border (dummy) − Language (dummy) − Colonial linkage (dummy) − Belong to same Regional Trade Agreement (RTA) (dummy) − Exporter belongs to RTA (dummy) − Bilateral trade agreement (dummy) − ASEAN Member (dummy) − Bangkok Agreement Member (dummy) − Economic Cooperation Organisation Member (dummy) − South Asia Association for Region Cooperation Member (dummy)
Lau and Bilgin (2010)	Estimated the trade elasticity of China's apparel cottons in the US Market.	Exporter: China Importer: USA	Clothing	1989-2009	Gravity model	− Import quantity − Import price − GDP
Gul and Yasin (2011)	Estimation of Pakistan's trade potential.	Exporter: Pakistan Importer: 42 countries including ASEAN, EU, Middle East, Latin America, North America	Multiple industries	1981-2005	Augmented Gravity model, panel data estimation	− Exporter and importer GDP − Per capita GDP − Distance − Border − Language − SAARC Member (dummy) − ECO Member (dummy) − Real exchange rate − Importer Trade openness − Exporter Trade openness

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Ullah and Inaba (2012)	Analysed the impact of trade agreements on export flows from Bangladesh and intra-regional trade flow.	Exporter: Bangladesh	Multiple industries	1992-2009	Gravity Model	– Exporter and importer GDP – Exchange rate – Distance – Common land borders – Remoteness
Chen and Li (2014)	Integrates the gravity model and trade intensity index to develop a new trade intensity index – gravity model adjusted trade intensity (GMATI), which can reflect the short run trade barriers and control long run barriers.	Exporter/Importer: China and 182 countries in Africa, East & Southeast Asia, EU, Middle East, North America, Oceania, South Africa, USSR	Multiple industries	1998-2005	Gravity model, OLS, cross-sectional data estimation Developed a new trade intensity index: Gravity model adjusted trade intensity (GMATI)	– Distance – Exporter and importer Real GDP – Exporter and importer Area – Exporter and importer Foreign exchange rate – Exporter and importer Institutional environment – Landlock – Island – Country border – Language – Exporter and importer belong to the same country between 1988-2005 (dummy) – If exporter established a colony in importing country (dummy) – Colonies of the same colonial power (dummy) – Colonial relationship after 1945 (dummy) – If exporter and importer have similar industrial structure of comparative advantage in year t. (dummy)
Natos et al (2014)	Examined the effect of geographical distance on intra-EU and extra-EU Cypriot agricultural exports.	Exporter: Cyprus Importer: EU, MPC	Agriculture	2004-2012	Augmented Gravity Model	– GDP – Population size – Distance – Language – Colonial link – Common colonizer – Common border (dummy) – Exporter/importer Landlocked (dummy) – Exporter/importer Island (dummy) – EU Member (dummy) – Mediterranean Partner Countries (MPC) Member (dummy)

Authors	Aim	Country of study	Industrial sector	Period of study	Method	Key dimensions
Lau et al (2017)	Examine how the growth of China's T&C exports displaced the exports of other Asia Developing countries.	Exporter: China Importer: ASEAN	Textile & Clothing	1990-2005	Gravity Model, Sensitivity analysis	– Exporter and importer Per capita GDP – Exporter and importer GDP – Distance – Exporter and importer Population – Real exchange rate – Labour cost of suppliers – No. of women in work force of exporting country – Value added amount in T&C industries of the suppliers – European country (dummy) – USA (dummy) – Effect of China's accession to the WTO since 2001 (dummy)

The majority of the studies on bilateral trade flows employs econometric analyses using the gravity model with OLS, and cross-sectional or panel data estimation. The gravity model is acknowledged as the most popular analytical approach used in bilateral trade research, and is a common practice to analyse the effects of total merchandise trade among nations (Tsang and Au, 2008).

Analysing the topics conducted, there appears to be two key research themes in international trade studies. One of these is 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). 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 ASEAN Free Trade Area (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.

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.

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 USA. 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.

The other common theme prevalent in the research literature concerned identify the

determinants of trade facilitation (Martinez-Zarzoso, 2003; Portugal-Perez and Wilson, 2010; Kien, 2009; Akinkugbe, 2009), and the impact of these on trade flow between countries (Chan et al., 2008; Djankov et al., 2010; Lau et al., 2017). 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. Similarly, Kien (2009) examined the determinants of export flows of ASEAN Free Trade Area (AFTA). They identified that export flows increases proportionally with GDP, and that the formation of AFTA has led to increase trade among the countries involved. Akinkugbe (2009) on the other than, examined how issues of trade facilitation continue to discourage the export of manufactured goods from Africa. Their findings showed that despite reductions in tariffs and non-tariff barriers in many African countries, there were still many issues of trade facilitation i.e. government policies, including restrictive trade and poor customs regulation and administration, which discouraged exporting in Africa.

There are many studies which explore the determinants of trade flow on international trade performance for different regional blocs. Many of these studies tend to focus on multi-industry trade for the countries examined. Studies which look at determinants for industry-specific trade are limited. Trade performance of T&C manufacturing has been explored in a small number of studies. For example, Chan et al. (2008) analysed the impact of economic factors that underpin India's textile 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 textile 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. More interestingly, they identified that infrastructure development, literacy rate and language commonality with the US, are factors pivotal to being a competitive supplier to the USA.

3. Determinants of bilateral trade

To collectively summarise all the determinants researched in the trade studies reviewed, the authors adopted Zou and Stan's (1998) vote counting technique to analyse and categorise the number of determinants presented in the literature. Sousa et al. (2008) also applied the same technique in their study reviewing the literature for determinants for export performance.

Interestingly, there does not appear to have a clear classification of determinants of trade flow presented in the research literature. Most notably, Wilson et al. (2003) has attempted to

classify the determinants of trade facilitation using four broad indicators: port efficiency, customs environment, domestic regulatory environment and the infrastructure to e-business usage. In a later study, Portugal-Perez and Wilson (2010) outline that trade facilitation measures can be divided into hard and soft dimensions. The hard dimensions refer to tangible elements like physical infrastructure such as roads, ports, highways, as well as telecommunication. The soft intangible dimensions include factors such as transparency, customs management, and business environment.

A review the determinants analysed by researchers is summarised in table 1. From the determinants identified, it can be observed that there are 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 as outlined by Wilson et al (2003), and Portugal-Perez and Wilson (2010). Table 2 summarises and categorises the determinants identified from the papers reviewed from 1960 to 2017 which uses a gravity models.

Table 2. Summary of determinants in categories.

	Tinbergen (1962)	Srivastava & Green (1986)	Thursby and Thursby (1987)	Summary (1989)	Gould (1998)	Stone & Jeon (1999)	Martinez-Zarzoso (2003)	Wilson, et al. (2003)	Huot & Kakinaka (2007)	Chan et al. (2008)	Hoekmann & Nicita (2008)	Tsang & Au (2008)	Akinkugbe (2009)	Giovannetti & Sanfilippo (2009)	Kien (2009)	Portugal-Perez & Wilson (2010)	Chi & Kilduff (2010)	Djankov et al. (2010)	Lau & Bilhin (2010)	Gul & Yasmin (2011)	Ullah & Inaba (2012)	Chen & Li (2014)	Natos et al. (2014)	Lau et al. (2017)	Total
Common determinants																									
GDP				✓	✓	✓	✓		✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	16
GNP	✓		✓					✓																	3
Per capita GDP									✓	✓			✓				✓			✓				✓	6
Per capita GNP	✓							✓																	2
Population size		✓		✓		✓	✓				✓				✓			✓	✓				✓	✓	10
Population growth										✓					✓										2
Distance	✓	✓		✓		✓	✓	✓	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	18
Time																		✓							1
Common Language		✓					✓	✓			✓				✓		✓	✓		✓		✓	✓		10
Exchange rate				✓					✓	✓					✓					✓	✓	✓		✓	8
Adjacency/Common border	✓						✓	✓			✓						✓	✓		✓	✓	✓	✓		10
Island/landlocked							✓				✓			✓								✓	✓		5
Remoteness											✓										✓				2
Colonialism/Colonial link		✓																				✓	✓		3
Political variables: stability, rights		✓		✓																					2
Import demand				✓	✓																				2
Export supply				✓	✓																				2
Import quantity				✓								✓							✓						3
Export quantity			✓	✓								✓													3
Import price			✓	✓															✓						3
Export price			✓																						1
Consumer Price Index			✓																						1

	Tinbergen (1962)	Srivastava & Green (1986)	Thursby and Thursby (1987)	Summary (1989)	Gould (1998)	Stone & Jeon (1999)	Martinez-Zarzoso (2003)	Wilson, et al. (2003)	Huot & Kakinaka (2007)	Chan et al. (2008)	Hoekmann & Nicita (2008)	Tsang & Au (2008)	Akinkugbe (2009)	Giovannetti & Sanfilippo (2009)	Kien (2009)	Portugal-Perez & Wilson (2010)	Chi & Kilduff (2010)	Djankov et al. (2010)	Lau & Bilhin (2010)	Gul & Yasmin (2011)	Ullah & Inaba (2012)	Chen & Li (2014)	Natos et al. (2014)	Lau et al. (2017)	Total
Land area																						✓			1
Literacy rate																	✓								1
Currency e.g. Euro										✓															1
Fixed mobile phone subscription per 1000 people													✓												1
Regional blocs																									
European Union (EU)						✓								✓	✓								✓	✓	5
ASEAN							✓	✓	✓								✓								4
South Asia Association for Region Cooperation (SAARC)																		✓		✓					2
Asia-Pacific Economic Cooperation (APEC)						✓												✓							2
Dynamic Asian Economies (DAE)						✓																			1
Caribbean community							✓																		1
Centro-American Common Market							✓																		1
MASHREK							✓																		1
Economic Community of West African States														✓											1
Common Market for Eastern and Southern Africa														✓											1
MERCOSUR															✓										1

	Tinbergen (1962)	Srivastava & Green (1986)	Thursby and Thursby (1987)	Summary (1989)	Gould (1998)	Stone & Jeon (1999)	Martinez-Zarzoso (2003)	Wilson, et al. (2003)	Huot & Kakinaka (2007)	Chan et al. (2008)	Hoekmann & Nicita (2008)	Tsang & Au (2008)	Akinkugbe (2009)	Giovannetti & Sanfilippo (2009)	Kien (2009)	Portugal-Perez & Wilson (2010)	Chi & Kilduff (2010)	Djankov et al. (2010)	Lau & Bilhin (2010)	Gul & Yasmin (2011)	Ullah & Inaba (2012)	Chen & Li (2014)	Natos et al. (2014)	Lau et al. (2017)	**Total**
Mediterranean countries							✓																		**1**
Mediterranean Partner Countries																							✓		**1**
Trade policies, agreements and programmes																									
North American Free Trade Area (NAFTA)					✓		✓	✓				✓			✓		✓								**6**
WTO										✓							✓							✓	**3**
Economic Cooperation Organisation (ECO) initiative																		✓		✓					**2**
Caribbean Basin Initiative (CBI)																	✓								**1**
African Growth and Opportunity Act (AGOA)														✓											**1**
Bangkok Agreement (BA)																		✓							**1**
Everything but Arms (EBA) initiative														✓											**1**
Free Trade Agreements (FTA)															✓										**1**
Trade facilitation factors																									
Physical infrastructure (i.e. quality or degree of								✓		✓		✓				✓	✓								**5**

	Tinbergen (1962)	Srivastava & Green (1986)	Thursby and Thursby (1987)	Summary (1989)	Gould (1998)	Stone & Jeon (1999)	Martinez-Zarzoso (2003)	Wilson, et al. (2003)	Huot & Kakinaka (2007)	Chan et al. (2008)	Hoekmann & Nicita (2008)	Tsang & Au (2008)	Akinkugbe (2009)	Giovannetti & Sanfilippo (2009)	Kien (2009)	Portugal-Perez & Wilson (2010)	Chi & Kilduff (2010)	Djankov et al. (2010)	Lau & Bilhin (2010)	Gul & Yasmin (2011)	Ullah & Inaba (2012)	Chen & Li (2014)	Natos et al. (2014)	Lau et al. (2017)	**Total**
infrastructure e.g. port efficiency, facilities, air transport etc.)																									
Customs environment (i.e. payment, fees, taxes, hidden barriers, administration, Corruption Perception Index, customs efficiency, procedures to enforce a contract, No. of start-up procedures)								✓			✓		✓				✓								**4**
Regulatory environment (i.e. transparency and stability of environmental regulations, Stringency of regulatory standards, Compliance with international environmental agreements, Enforcement of environmental regulation)								✓	✓		✓		✓			✓						✓			**6**
eBusiness infrastructure e.g eCommerce.								✓					✓												**2**
Trade Restrictiveness e.g. tariff restriction, trade											✓		✓							✓					**3**

	Tinbergen (1962)	Srivastava & Green (1986)	Thursby and Thursby (1987)	Summary (1989)	Gould (1998)	Stone & Jeon (1999)	Martinez-Zarzoso (2003)	Wilson, et al. (2003)	Huot & Kakinaka (2007)	Chan et al. (2008)	Hoekmann & Nicita (2008)	Tsang & Au (2008)	Akinkugbe (2009)	Giovannetti & Sanfilippo (2009)	Kien (2009)	Portugal-Perez & Wilson (2010)	Chi & Kilduff (2010)	Djankov et al. (2010)	Lau & Bilhin (2010)	Gul & Yasmin (2011)	Ullah & Inaba (2012)	Chen & Li (2014)	Natos et al. (2014)	Lau et al. (2017)	Total
openness, restrictive trade policies																									
ICT																✓									1
Non-tariff barriers (quantitative restrictions, technical product regulations)											✓														1
Trade preferential margins e.g. volume of trade											✓														1
Government Support e.g. Domestic credit to private sector													✓												1
Textile and clothing manufacturing variables																									
Labour costs												✓												✓	2
No. of women in workforce																								✓	1

3.1. 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. These include GDP, per capita GDP, and distance. 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). 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 and population growth rate are also common variables used. 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). Table 2 also reveals 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.

Other than the common economic related variables, some studies also included common dummy variables to control cultural similarity among trade partners, such as common language, common borders, landlocked, exchange rate, 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).

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

The regional blocs examined in the studies reviewed varied from study to study. Table 2 shows analysing bilateral trade relations with EU and ASEAN countries are popular. In addition, variables such as common memberships in a Free Trade Area or trade organisation have been included in the gravity model, as these factors can enhance or impede trade between nations. From the studies reviewed, common membership in NAFTA and WTO were identified to be frequently explored.

3.3. Trade facilitation factors

Trade facilitation factors explored in the literature were fragmented and consisted of numerous studies adopting a variety of determinants. Wilson et al.'s (2003) trade facilitation index (TFI) which measured trade facilitation factors based on four key areas has been adopted in other studies (e.g. Akinkugbe, 2009; Hoekmann and Nicita, 2008). The four areas are port efficiency, customs environment, domestic regulatory environment, and infrastructure to e-business usage. Wilson et al.'s (2003) TFI provides a useful guide to categorising trade facilitation related determinants of trade measured in the literature.

The first area of the TFI is port efficiency, which is defined by three indexes: port efficiency, port facilities and inland waterways, and air transport. A number of studies have included a determinant labelled *infrastructure* in their gravity models (Portugal-Perez and Wilson, 2012; Chi and Kilduff, 2010) to explain the quality or degree of physical infrastructure, which 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. Wilson et al. (2003) found that port efficiency has the largest effect on trade, and improvement in this area can lead to the greatest gains for intra-APEC trade.

Determinants related to customs is also frequently included in the gravity equation (Hoekmann and Nicita, 2008; Akinkugbe, 2009). Wilson et al.'s (2003) index for customs environment is defined by factors related to irregular payments, low import fees, hidden import barriers, bribery and corruption, and a Corruption Perception Index. Similar factors have been acknowledged by Hoekmann and Nicita (2008), who refers 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.

The third trade facilitation area that Wilson et al. (2003) had identified was the regulatory environment, which concerned transparency and stability of environmental regulations, stringency of regulatory standards, compliance with international environmental agreements, and enforcement of environmental regulation. 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) included a variable labelled *business environment* which explains the degree of business friendly environment and regulations of a country. Chen and Li (2014) included a variable measuring a country's quality of contract enforcement.

Table 2 reveals that trade facilitation factors concerning physical trade infrastructure, customs environment and regulatory environment are the key dimensions explored in the research literature. Determinants concerning e-business environments was the fourth area of Wilson et al.'s (2003) trade facilitation index has not been explored as frequently, although

Wilson et al. (2003) noted that greater e-business use can significantly expand trade. Factors related to ICT and telecommunication are also limited in the research literature.

3.4. Determinants for T&C trade

Six studies were identified from the literature which examined the T&C industry. The analysis 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. There are also T&C studies which included exchange rate, common language, and common borders which could enhance or impede trade flow. Dummy variables for memberships of FTA or trade organisations such as NAFTA and WTO are frequently included. 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. Only one study, Chi and Kilduff (2010), included variables related to infrastructure and tariffs in their study, which to an extent, represents a small part of the diverse trade facilitation factors addressed in Wilson et al.'s (2003) TRI. A call for more empirical studies on determining trade facilitation factors for the T&C sector is needed.

Interestingly, industry-specific determinants which are fundamental to the T&C industry, such as environmental and sustainable factors were also limited among the studies reviewed. The variables identified in the review were related to human labour issues. For example, Lau et al. (2017) included a dummy variable for the number of women in the workforce of foreign manufacturing firms. Another variable identified from two studies (Tsang and Au, 2008; Lau et al., 2017) examining bilateral trade of T&C manufacturing was labour cost. 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.

4. Sustainability in T&C manufacturing and trade

The T&C industry is often connected with environmental problems linked to the production process (Perry, Kauric and Novak, 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 Defence Council (NRDC, 2016) commented that textile-making is incredibly wasteful and polluting; and is concluded to be one of the most polluting industries in the world (Pedersen and Anderson, 2015). 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 textile 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 OBOR initiative.

5. 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 reveals there are three key groups: 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 no. of female work force were included in previous trade studies.

Reviewing the literature on determinants for bilateral trade flows revealed some interesting observation. 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.

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 developing an index of these trade facilitation factors to assist in the development of T&C trade and economic development between nations, for example, assisting Chinese manufacturers in the OBOR initiative for trade expansion into less developed OBOR countries. Moreover, industry specific analysis for the T&C sector could also give rise to opportunities for future research to examine how some of the fundamental issues for sustainability will impact T&C trade.

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