

Full Length Research Paper

Selection of ocean container carriers: One country's perspective

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The objective of this study is to identify the most influential factors that affect choice of ocean container carrier by freight forwarders. It identifies the most influential factors considered by them when selecting ocean container carriers by analysing data collected from a survey of 105 freight forwarding organisations in Ghana. Exploratory factor analysis is used to identify the underlying factors which influence the selection of carrier. The findings of the study indicate that service quality, document accuracy, freight rates, environmental issues, schedule reliability and quick handling are the most influential factors that guide freight forwarders when purchasing liner shipping service. This study provides a better understanding of these influential factors from the perspective of the freight forwarders themselves. The findings are important to ocean container carriers since they can enable liner shipping companies to channel resources appropriately in response to factors which are identified as determining freight forwarder carrier selection.

Key word: Freight forwarders, ocean container carriers, carrier selection factors.

INTRODUCTION

Factors that affect the choice of ocean carriers are widely discussed in the literature (Brooks, 1983, 1990, 1995; Kannan et al., 2011; Lu, 2007). In recent times, the analysis of carrier selection factors has been mainly focused on the selection of carriers from the perspective of big shippers (Mohammaditabar and Teimoury, 2008; Setamanit and Pipatwattana, 2015). Shippers are considered the main decision makers for choice of carrier. In reality, it is the freight forwarders who are the true decision makers, because they are responsible for booking large blocks of containers space from ocean container carriers and for selling off container space in

smaller quantities to shippers (Fransoo and Lee, 2013). Ocean container carriers are exploring this issue so as to identify all factors that influence their customers when purchasing their shipping services. Liner shipping is market driven, and the survival of ocean container carriers in this dynamic market depend on a carrier's ability to secure high container volumes on a day to day basis to fill ship holds on every single voyage (Fanam et al., 2015). Ocean container carriers are facing increasing challenges in recent times due to globalisation and the acceleration in ship technology as well as larger ship sizes and new demands from transport service buyers.

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In addition to that, mega ships (18,000TEU+) have been exerting even more pressure on ocean container carriers to attract enough container volume so that they can breakeven on each voyage. The high level of competition among ocean container carriers suggests that there is a need for a formulation of strategies by carriers to differentiate themselves from competitors in order to attract more container volume. This, for example, have lead to the formation of alliances, liner conferences and mergers and acquisitions between bigger and smaller players within the liner shipping sector (Higashida, 2015). Much research has been carried out on carrier selection, mode choice, port selection and port competitiveness from the viewpoint of shippers (Lam and Yap, 2011; Nir et al., 2003; Notteboom, 2006a; Tongzon and Sawant, 2007; Tovar et al., 2015). However, this paper aims to analyse the selection criteria of ocean container carriers from the perspective of freight forwarders themselves.

CARRIER SELECTION CRITERIA FROM ONE COUNTRY'S PERSPECTIVE

The maritime transport industry has undergone tremendous progress over the last two decades (Tang et al., 2011). This has resulted in greater attention being paid to identify every significant factor that influences the selection of ocean container carriers. The importance attached to each selection criteria seems to differ on a regional basis. For example, service quality and equipment availability tend to be more important to Asian companies than European or North American companies (Gailus and Jahn, 2013). The differing priorities on ocean container carrier selection according to geographical regional have been well discussed in the literature, as shown in Table 1. As shown in Table 1, carrier selection factors differ from region to region. The growing demand of e-business has caused Asian shippers to consider service related factors to be more important than others because goods need to reach their intended destination in real time. The most frequently cited factors prioritized by Asian shippers and freight forwarders are customer service, Bill of Lading accuracy, on-time pickup/delivery, customer loyalty and reliability of service. Early studies from North America considered cost as the most important because shippers were interested in reducing logistic operational costs (Brooks, 1985; Gibson et al., 2002; Murphy and Daley, 1995). However, recent studies from North America have discovered that service related factors (that is, transit time, quality service, on-time delivery performance) have become more important (Ben-Akiva et al., 2013; Maloni et al., 2013; Zsidisin et al., 2007).

Even within the same region, carrier selection factors have tended to differ based on the client segment in question. Some empirical analysis conducted by Wen

and Huang (2007) pointed out that freight forwarders operating in Taiwan considered Bill of Lading accuracy, ability to trace shipments and pickup and delivery service to be the three most important factors to influence their choice of ocean container carrier. Chung et al. (2011) also investigated carrier selection factors important to Taiwanese freight forwarders and discovered that expertise in sales representatives and transportation reliability were the most important attributes valued by the freight forwarders. The study conducted by Shang and Lu (2012) evaluated factors that influenced freight forwarders carrier choice in Taiwan as well, and revealed that customer relationship management, that is, customer responses were the most important for them. Yang (2012) investigated the most critical selection factors in Taiwan and found that logistics service reliability capability was the most valuable capability to ocean freight forwarders there, followed by flexibility capability and logistic value-added service capability. Lin and Yeh (2013) also analyzed carrier selection attributes in the Taiwanese market and identified delivery cost and time as the most significant attributes to the customers in the optimal choice of carriers.

Freight charges, tracking and expediting shipments were identified as the most significant factors influencing freight forwarders in the North America market (Murphy and Daley, 1995). Some empirical analysis conducted by Brooks (1995) revealed that the freight rate, the problem-solving capability of a carrier, and the availability of equipment were the three most important factors affecting shipper choice of ocean container carriers there. Again, Kent and Parker (1999) found that freight rate was one of the most important factors affecting the selection of ocean carrier from the shipper perspective there. Freight rate was also identified by Kannan et al. (2011) as the most important factor in ocean container carrier selection from the shipper's perspective there. Additionally, statistical analysis conducted by Van den Berg and De Langen (2014) on how shippers and freight forwarders assessed liner shipping companies found that both of these customers were mainly cost driven. Premeaux (2010) identified that not just flexible rates but also the carrier's effective response to emergencies or unexpected situations as the most important factors influencing shipper selection of carriers in that region.

Other important factors identified in the literature are pickup/delivery reliability, door-to-door service, schedule reliability, quality service, operational efficiency handling equipment and transit time (Ben-Akiva et al., 2013; Fransoo and Lee, 2013; Frémont, 2009; Larson and Gammelgaard, 2001; Notteboom, 2006b; Yang et al., 2014; Yuen et al., 2015). Voss et al. (2006) analysed the significant factors that drove transport service buyers when selecting ocean carrier and found that delivery reliability, rates charged, and carrier reputation were the three most important factors taken into consideration by shippers. Additionally, Saldanha et al. (2009) identified

Table 1. Carrier selection factors from regional perspective

Literature	Factors	Countries in covered in the study
Lu (2007)	Operation capability, customer service	Taiwan
Wen and Huang (2007)	B/L accuracy, ability to trace shipment and pick-up/delivery service	Taiwan
Wong et al. (2008)	Customer service and cargo handling capabilities	Taiwan
Hu and Jen (2010)	Service quality and customer loyalty	Taiwan
Chung et al. (2011)	Sales representatives expertise and transportation reliability	Taiwan
Shang and Lu (2012)	Customer response	Taiwan
Yang (2012)	Logistics service reliability	Taiwan
Lin and Yeh (2013)	Reliability, delivery cost and time	Taiwan
Lirn and Wong (2013)	Total cost, cargo quality control, carrier service attributes	Taiwan
Chu (2014)	Discount offering, low rate of damage and service consistent	Taiwan
Wen and Lin (2015)	Service performance, reputation, freight charges and information tech.	Taiwan
Banomyong and Supatn (2011)	Accuracy of documents, freight rates	Thailand
Setamanit and Pipatwattana (2015)	Reliability of service, quality of service, cost and after-sale service	Thailand
Abshire and Premeaux(1991)	Total transit time, carrier's leadership in offering more flexible rates	US
Lewis et al. (1993)	On-time pickups, on-time delivery, competitive rates	US
Brooks (1995)	Rate, problem-solving capability of carrier, availability of equipment	US/Canada and Europe
Murphy and Daley (1995)	Freight charges, tracking and expediting shipments	US
Crum and Allen (1997)	Transit time, pickup and delivery reliability	US
Gibson et al. (2002)	Cost, effectiveness, trust, flexibility	US
Zsidisin et al. (2007)	On-time delivery performance	US
Premeaux(2010)	Flexible rates, response to emergency, IT	US
Ben-Akiva et al. (2013)	Quality service and total logistics costs	US
Maloni et al. (2013)	Transit time, CO ₂ reduction operations	US/Asia
Gailus and Jahn (2013)	Reliability, transit time	Germany
Kannan et al. (2011)	Low rate, pricing flexibility and flexibility	India
Van den Berg and de Langwn (2014)	Cost driven	Netherlands
Lam and Zhang (2014)	Cost control, reliability and responsiveness	Singapore
Harrison and Fichtinger (2013)	Time, schedule, transit time and frequency	UK

transit time and transit time reliability as the most critical factors which influenced the decision making of freight service buyers when selecting ocean container carrier.

It is clear that a number of studies have been conducted on carrier selection from Asian, North American and European perspectives. However, little or no study has been carried out from the African perspective. Therefore, this paper will analyse factors which influence the choice of carrier from the perspective of Ghanaian freight forwarders. It will identify some of the

most influential factors that affect carrier selection within the African geographical context. The main findings of this paper are based on a survey conducted among Ghanaian freight forwarders and are discussed subsequently.

METHODOLOGY

Here, the methods employed to develop the survey questionnaire and collection of data will be discussed. The survey instrument was

designed based on a literature review of the field and on extensive discussions with freight forwarders and academics in the field. A thirty-nine item scale of importance was developed based on these discussions. Respondents were asked to indicate their levels of agreement between five scales of '1' strongly disagree, and '5' strongly agree.

The sample for this study was drawn from the member list of the Ghana Institute of Freight Forwarders Association in Ghana. There are 301 members in the association, with 250 companies possessing email addresses and telephone contact numbers. Therefore, to maximise the sample population, these 250 were targeted. Sample companies were cross-checked with the Ghana Shippers Authority and the Ghana Ports and Harbour Authority to avoid duplicate mailings. A pre-notification email was sent to the targeted respondents a week in advance to introduce the topic to them, and this was followed by the questionnaire survey. There were 57 undeliverable responses received back upon sending out the questionnaire, reducing the effective sample size of this study to 193.

Table 2 summarises the characteristics of survey respondents. Categorised by job titles, respondents were made up of 40% directors / chief executive officers (CEOs), 38% managers, 1% sales executives, 13% supervisors, 3% administration staff and 5% others. In addition, 78% of the respondents were working at higher management levels in their organisations with six years or more of experience. The results also showed that a majority of the respondent organisations, that is, 86% were seasoned freight forwarding companies operating for more than six years. Nearly 60% had been in the freight forwarding business for more than ten years. With regards to the service capabilities of respondent organisations, 97 (92%) of the 105 respondents considered themselves to be engaged in import clearance, and the rest were as follows: 94 (89.5%), 72 (68.5%), 60 (57.1%), 29 (27.6%), 25 (23.8%) and 8 (7.6%) were in export clearance, warehousing, road haulage, vessel operation, inventory management and other services respectively. The demographics suggest that respondents were sufficiently experienced to be capable of answering the questions.

RESULTS

The results of the empirical analysis of the data collected from the freight forwarders are presented here.

Identification of influential carrier selection criteria

Freight forwarders were asked to rate the thirty-nine listed items to enable the researcher to evaluate the most influential factors that affect selection of ocean container carrier. A total of 112 responses were received and out of the 112 returned questionnaires, seven were incomplete with significant data missing, and hence these were not included in the data analysis. A total of 105 usable questionnaires were collected, representing 54.4% (105=193) of the valid sample size. A test of non-response bias was conducted to assess the extent of potential bias in the results, since the survey response was less than 100% (Armstrong and Overton, 1977; Lai and Cheng, 2004). The non-response bias was assessed by dividing the 105 responses into two groups, namely, early (n¼55, 52.3%) and late (n¼50, the remaining

47.7%) respondents. No significant differences were found, thus this study concluded that there was no evidence of non-response bias.

Responses were rated on a 5-point Likert scale, with the median showing that approximately 34% of the responses were at scale 5 indicating that they strongly agree, and the rest were on scale 4. All the mean values of responses were higher than the respective midpoint (3) of the Likert scale, which indicated that respondents were well aware of the key factors which influenced their selection of ocean container carriers. The standard deviation of items was within a range of between 0.74 and 1.28, which showed the parametric nature of the data set. The overall average of perspectives of respondents on factors influencing the choice of ocean container carriers was (3.86), indicating a high level of awareness among respondents.

Reliability tests on component scores were conducted using the Statistical Package for the Social Sciences (Version 22). Exploratory factor analysis (EFA) was applied using Direct Oblimin rotation. Factors were retained using an eigenvalue greater than one. The sampling adequacy test was conducted which included the test statistic of the Kaiser-Meyer-Olkin measure of sampling adequacy (0.878) and which was above the recommended cut-off value of 0.50 (Yong and Pearce, 2013). This indicated that the data of this paper met sampling adequacy. Similarly, Bartlett's Test of Sphericity Chi-Square for the sample was 3154.83, with statistical significance at $0.000 < 0.01$ (Table 3).

In order to extract suitable factors that would give a clear interpretation of the results of EFA, this paper adhered to the following guidelines to include or exclude items from a factor. Items with loading $> .5$ were retained, and items with a cross loading difference between the two items loadings of $> .3$ were eliminated (Costello and Osborne, 2005). The result revealed six key factors that the freight forwarders employed when purchasing freight services from ocean container carriers.

The six key influential factors retained explained 71% of the cumulative variance. The first factor accounted for 41.9%, while the second, third, fourth, fifth and sixth factors accounted for 11.4, 5.8, 4.6, 4.0 and 3.7% respectively (Table 4). The Cronbach's Alpha coefficient was used to test the reliability and the Cronbach's Alpha coefficient values for each of the six influential factors regarding ocean container carrier selection were 0.741, 0.899, 0.746, 0.698, 0.680 and 0.791 respectively (Table 4). This indicated a relatively high level of reliability among variables denoting that the identified variables were strongly measuring the same construct.

The six factors contained 16 items with factor loading of above 0.6. As indicated in Table 4, the first factor contained three items, namely; shipping line provision of emergency services (0.727), the professionalism of shipping line staff (0.715), and shipping line staff knowledge (0.602). All the items under this factor focused

Table 2. Characteristics of respondents

Characteristics	Count	Percentage (%)
Total valid sample size	105	100
Number of years respondents organizations is operating in freight forwarding business		
Less than 5 years	15	14
6-10 years	31	30
11-15 years	20	19
16-20 years	15	14
21-25 years	10	9
26-30 years	5	5
More than 30 years	9	9
Number of employees working in the respondents organizations		
Less than 20 employees	41	39
21-40 employees	23	22
41-60 employees	13	12
61-80 employees	2	2
81-100 employees	10	10
101-120 employees	3	3
More than 121 employees	13	12
Type of business provided by the respondents organization		
Freight forwarding	96	91.40
Customs broker	56	53.30
Cargo consolidator	51	48.60
Shipping agency	28	26.70
Non vessel operating common carrier	19	18.10
Legal counselor	5	4.70
Other	13	12.40
Type of services provided by the respondents organization		
Import clearance	97	92
Export clearance	94	89.50
Warehousing	72	68.50
Road haulage	60	57.10
Vessel operation	29	27.60
Inventory management	25	23.80
Other	8	7.60
Designation of survey respondents		
Director/CEO	42	40
Manager	40	38
Sales/marketing executive	1	1
Supervisor	14	13
Administrator	3	3
Other	5	5
The numbers of years' working experiences that respondents have in the freight forwarding sector		
Less than 5 years	23	22
6-10 years	19	18
11-15 years	24	23
16-20 years	16	15
21-25 years	12	11
26-30 years	8	8
More than 31 years	3	3

Table 3. KMO and Bartlett's test (initial run).

Kaiser-Meyer-Olkin measure of sampling adequacy		0.878
Bartlett's test of sphericity	Approx. Chi-square	3154.826
	df	741
	Sig.	0.000

on the shipping line's services. Hence, the factor was named 'service quality'. The second factor included carriers using renewable energy (0.949), carrier's commitment to reducing CO₂ emissions (.885) and environmentally friendly operations by the shipping line (0.810). This factor was named 'environment issues' because all the items under it focused on a greener environment. The third factor included items such as frequency of port calls (0.730), cargo tracking (0.681) and on-time invoicing by the shipping line (0.679). This factor was labelled 'schedule reliability' because all the items in it focused on the shipping company offering reliable scheduled service. The fourth factor comprised of two elements, the availability of door-to-door or multimodal transport services (0.838) and dedicated berth by the shipping line (0.727). The items under this factor pointed to the liner shipping company's ability to handle cargo quickly without delay through the logistics chain. Consequently, the factor was named 'quick handling'. The fifth factor contained item statements such as transparency of freight rates and charges (0.849) and simplicity of freight rates and their structure (0.686). This factor was labeled 'freight rate' because items in it focused on freight rate related issues. Finally, the sixth factor was named 'document accuracy' because it covered question statements such as the accuracy of shipping documents (0.917), the on-time quoting of rates and charges by the shipping line (0.698) and the shipping service's reliability (0.662).

DISCUSSION AND IMPLICATIONS

Key factors that influence freight forwarders' choice of ocean container carrier are of central importance when determining competitiveness of ocean container carriers (Wen and Lin, 2015). The results indicate that the service quality provided by liner shipping companies is important to freight forwarders, especially, the professionalism of the carrier's staff as well as their knowledge about the kinds of services that they provide to them. Liner shipping companies need to invest more in their staff through training so as to enhance staff knowledge about all services being offered. This finding is consistent with a study by Salleh et al. (2014) which found that knowledge management capability of staff and the improvement of employee efficiency was key in providing a quality liner shipping service. Thus, it is

important that ocean container carriers focus their resources on providing shipping service quality. A liner shipping company that intends to provide a quality shipping service to satisfy customers must improve the knowledge of its staff and also enhance the professionalism of staff regarding how they respond to freight forwarder emergency services.

Environmental issues are also critical to freight forwarders when selecting ocean container carriers. The debate over global warming and emission reduction in international shipping is an important topic dominating governments and international organisations (Luo, 2013), and freight forwarders are closely following this debate. Stakeholders within the maritime sector such as exporters/importers, governmental bodies and non-governmental organisations are concerned about the effect of shipping associated activities on the marine system (Wu and Dunn, 1995). The maritime sector, especially the liner sector is required to operate its ships in a more environmentally friendly manner due to increasing awareness and concern from stakeholders regarding global warming and climate change issues. As a result, freight forwarders are paying critical attention to how liner shipping companies respond to environmental issues with regards to reducing environmental pollution as well as their commitment to cut down CO₂ emissions.

The results of this paper suggest that freight forwarders are also paying a high degree of attention to schedule reliability when purchasing liner shipping services. Freight forwarders plan a cargo owner's supply chain with realistic expectations about delivery times, and therefore select a shipping line that has reliable schedule service to enable them to achieve these supply chain goals. Schedule reliability is therefore an important factor that freight forwarders consider when selecting an ocean carrier, since an unreliable schedule can have a knock-on effects on the container supply chain. This is consistent with similar findings reported in other studies (Chung and Chiang, 2011; Lam and van de Voorde, 2011; Lun and Browne, 2009; Vernimmen et al., 2007; Zhang and Lam, 2014). The higher loading of 'frequency of port calls' within the schedule reliability factor indicated that freight forwarders depend on a carrier that calls ports frequently in order for them to achieve the expected delivery times. Liner shipping companies should therefore channel their resources into providing reliably scheduled services by making cargo tracking services accessible to freight forwarders, because 'cargo tracking' was similarly rated

Table 4. Six Components rotated - pattern matrix^a.

Items	Component					
	Service quality	Environment issues	Schedule reliability	Quick handling	Freight rate	Document accuracy
Cronbach's alpha	0.741	0.899	0.746	0.689	0.680	0.791
Percent of variance	41.90	11.40	5.80	4.60	4.00	3.70
Shipping line provision of emergency services	0.727	0.068	0.098	0.064	-0.069	0.002
Professionalism of the carrier's staff	0.715	0.078	0.028	0.014	0.102	0.131
Carrier staff knowledge	0.602	0.178	-0.010	-0.059	0.251	0.112
Carrier using renewable energy	-0.058	0.949	-0.023	-0.004	0.048	-0.033
Carrier's commitment to reducing CO ₂ emissions	0.036	0.885	0.011	0.062	0.059	-0.015
Environmentally friendly operations by the shipping line	0.163	0.810	-0.009	0.069	-0.112	0.026
Frequency of port calls	-0.128	-0.068	0.730	-0.021	0.211	0.180
Cargo tracking	0.053	0.340	0.681	-0.024	0.046	0.074
On-time invoicing by the shipping line	0.309	-0.137	0.679	0.161	0.054	-0.075
Availability of door-to-door or multimodal transport services	-0.221	0.196	0.149	0.838	-0.057	0.097
Dedicated berth by shipping line	0.355	-0.060	-0.165	0.727	0.176	-0.063
Transparency of freight rates and charges	-0.087	-0.049	0.100	0.079	0.849	0.073
Simplicity of freight rates and their structure	0.258	0.116	0.072	-0.031	0.686	-0.006
Accuracy of shipping documents	-0.039	0.005	-0.180	0.030	0.107	0.917
Quoting of freight rates and charges on time by shipping line	0.246	-0.058	0.218	0.070	-0.194	0.698
Service schedule reliability	0.013	0.041	0.291	-0.068	0.121	0.662

Extraction method: Principal component analysis. Rotation Method: Oblimin with Kaiser Normalization.

highly by them within the factor of schedule reliability.

Freight forwarders considered the ability of liner shipping companies to deliver goods quickly as very important as well. They perceived the smooth flow of goods through the supply chain without any interruption as essential for them to be able to achieve door-to-door delivery on time for their clients. The higher loading for them of dedicated berthing by shipping lines with quick handling items indicated that freight forwarders attributed a high-level of concern to a liner shipping company's ability to obtain a berth on arrival

without delay. The berthing of ships on arrival by shipping companies or berth allocation by shipping lines is perceived as a central factor (Fanam et al., 2016), because it enables them to access their cargo in real time. Freight forwarders perceive dedicated berth operations by shipping lines as an effective way to improve the performances of container transportation. This result confirmed the findings by Frémont (2005) and Hsu et al. (2015) which stated that dedicated berthing does not help only shippers and freight forwarders, but it also helps shipping lines to control ship and cargo handling more closely, and

it further benefits them in exploiting greater levels of profitability than those formerly realised in the port terminal sector.

In the same way, liner shipping companies need to pay attention to the simplicity of freight rates and their structure, as well as the general transparency of their freight rates and charges. This is because freight forwarders are a transport intermediary who buys transport services on behalf of their clients and they are critically concerned with freight rate settings and the structure of liner shipping companies. A high loading among responses on the transparency of

freight rates and their structure indicated that survey respondents were particularly concerned about the composition of freight rates. Therefore, ocean container carriers should try their best to set up a freight rate template or table that can be easily understood, rather than quoting lumpsum total freight rates, which are difficult for the freight forwarders to understand.

From the perspective of the Ghanaian freight forwarders, ocean container carriers need to strive hard to maintain a high level of documentation accuracy. A shipping line's ability to provide error-free documentation is paramount to their competitiveness. For example, an error free Bill of Lading, quote of rates, delivery order, cargo manifest and other shipping related documents enhances the shipping line's possibility to be selected by freight forwarders. It has been found that the accuracy of documents is one of the most important factors to influence shipper choice of shipping lines as well, as those documents are used as formal evidence especially in procedures concerning the international payment of goods (Banomyong and Supatn, 2011; Lu, 2003). It is important for shipping companies to pay close attention to accurate shipping documents because any discrepancies on these can cause delay and even lead to penalties and other charges, such as the fee for a letter of credit correction, or amendment of the bill of lading.

Understanding the key factors that influence the decision making of freight forwarders is paramount for liner shipping companies because it can enable them to better focus their resources on marketing strategies and better address these factors, thus attracting more of them to their liner shipping services.

This paper makes some important contributions to the field. Firstly, it analyzed ocean carrier selection literature from the regional dimension, focusing on key factors which influence the choice of carrier across regions. Secondly, the paper addressed the views of the true decision makers in the selection of the ocean container carriers. Thirdly, this paper discussed the importance of liner shipping companies coming to understand the critical factors which affect their market share. Finally, this paper outlined the six important factors that freight forwarders employ when choosing an ocean container carrier from the Ghanaian perspective.

The main limitation of this paper is that it focuses on freight forwarders operating within the maritime sector. Also the selection of respondents was limited to one respondent per company. In the same way, the study was limited to only one country, namely Ghana. Future studies should consider comparing selection factors from different countries, or even compare them across different regions.

Conflicts of interests

The authors have not declared any conflict of interests.

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