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Big data analytics and international market selection: An exploratory study

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ABSTRACT A great deal of information is available on international trade flows and potential markets. Yet many exporters do not know how to identify, with adequate precision, those markets that hold the greatest potential. Even if they have access to relevant information, the sheer volume of information often makes the analytical process complex, time-consuming and costly. An additional challenge is that many exporters lack an appropriate decision-making methodology, which would enable them to adopt a systematic approach to choosing foreign markets. In this regard, big-data analytics can play a valuable role. This paper reports on the first two phases of a study aimed at exploring the impact of big-data analytics on international market selection decisions. The specific big-data analytics system used in the study was the TRADE-DSM (Decision Support Model) which, by screening large quantities of market information obtained from a range of sources identifies optimal product–market combinations for a country, industry sector or company. Interviews conducted with TRADE-DSM users as well as decision-makers found that big-data analytics (using the TRADE-DSM model) did impact international market-decision. A case study reported on in this paper noted that TRADE-DSM was a very important information source used for making the company's international market selection decision. Other interviewees reported that TRADE-DSM identified countries (that were eventually selected) that the decision-makers had not previously considered. The degree of acceptance of the TRADE-DSM results appeared to be influenced by TRADE-DSM user factors (for example their relationship with the decision-maker and knowledge of the organization), decision-maker factors (for example their experience and knowledge making international market selection decisions) and organizational factors (for example senior managements' commitment to big data and analytics). Drawing on the insights gained in the study, we developed a multi-phase, big-data analytics model for international market selection.

KEYWORDS Analytics, big data, export decision-making, international market selection

1. INTRODUCTION

Choosing an international market is an important decision. There is a plethora of information from numerous sources and dozens of analytical models available to help people make the international market selection decision. While there has been much research

conducted on international market selection, weaknesses (as described below) are evident in studies that look at the application of big-data analytics in the evaluation and selection of markets.

This paper reports on a preliminary study conducted to start addressing this void in the

literature. The paper discusses the results of the first two phases of the study, which involved interviewing users of an international market selection big-data analytics system, called the TRADE-DSM. Also interviewed were decision-makers who have used the TRADE-DSM output. The paper identifies a link between the application of the TRADE-DSM and international market selection, and proposes a big-data analytics and international market selection model based on the information gathered from the interviews. In addition, the paper presents a case study to illustrate the proposed big-data analytics model.

2. LITERATURE REVIEW: INTERNATIONAL MARKET SELECTION AS A BIG-DATA ANALYTICS CHALLENGE

One of the most efficient ways of enhancing firms', and consequently countries', growth is by stimulating exports. Increased exports directly and positively impact job creation, poverty alleviation and economic development, and help to promote sustainable and balanced economic growth in a country or region (Czinkota and Ronkainen 1998; Steenkamp et al. 2012; Los et al. 2015).

In the Executive Opinion Survey of the World Economic Forum's Global Enabling Trade Report (2016), respondents were asked to select the five (out of a possible 12) most problematic factors affecting their ability to export more efficiently and effectively, ranking them from 1 (most problematic) to 5 (least problematic). The factor that most executives said was the most problematic and therefore the most important was the identification of potential markets and buyers of goods (WEF 2016).

In the literature, the problems associated with the identification of potential markets tend to fall into two categories: the lack of information and the lack of an appropriate decision-making methodology. While there is a plethora of information on international markets (see, for example, <https://globaledge.msu.edu/>), exporters – and in particular, early-stage exporters – do not know how and where to find the necessary international market information. This lack of knowledge of where to find information on possible export markets has often been cited by exporters (and scholars) as one of the most challenging export barriers to overcome when firms wish to enter new international markets

and/or expand their current export operations (Johanson and Vahlne 1977; Reid 1981; Wiedersheim-Paul et al. 1987; Katsikeas and Morgan 1994; Leonidou 2004). Souchon et al. (2015) emphasise the importance of export market orientation as the key differentiator between successful and less successful exporting firms. Research points to the importance of international market selection being scientifically determined, and not the result of hearsay or causal analysis, if firms are to generate sustainable returns (Cameron et al. 2017; Calof and Lane 1988).

At the exporter level, the challenge is to determine which markets offer realistic opportunities in terms of products and markets (WEF 2016). At the macro level, governments and policymakers need to introduce export assistance programmes or information services that focus on the intelligence needs of exporters (Calof 1997). These needs relate to determining the best markets for their countries and companies and being assisted in accessing them, for example, through governments' negotiations of trade agreements and the formulation of appropriate policies and related measures (Kühn and Viviers 2012; Cuyvers et al. 2012b, Lederman et al. 2006, 2016; Cameron et al. 2017).

Given the growing importance and expansion of international business over the years, it is not surprising that there has been a corresponding increase in the amount of information available to help in the selection of export markets. Websites such as Global Edge Insights (globaledge.msu.edu), the Federation of International Trade Associations (www.fita.org/webindex.html) and Gapminder (www.gapminder.org) provide access to many sources of information that assist international market selection. Gapminder, for example, has well over 100 variables that can be used to select export markets. The information for these variables is drawn from numerous statistical agencies, governments and consulting firms around the world. The challenge, therefore, for exporters and policymakers is how to harness and correctly interpret the huge volumes of information that lack structure and coherence and, moreover, are constantly being revised and embellished (Cameron et al. 2017). Although all firms require information on which to make informed business decisions, in the case of exporters the importance of acquiring the correct information is even greater because of the complexities of the international business

environment and the export process itself (Souchon and Diamantopolous 2000; Kühn and Viviers 2012).

It is not just the amount of international market selection information that has exploded over the years. The number of analytical models and theories for selecting international markets has increased as well. The speed at which scientific research is accelerating, accompanied by the sheer volume of information, is making it very difficult for even the most knowledgeable expert to keep up with developments in their own industries (Hughes 2017).

Ozturk et al. (2015) examined the international market selection literature finding dozens of such models. They compared many of the different models and then summarised the criteria that were used in these studies. They divided the criteria into six broad categories:

- i. Demographic environment, including for example population, age and gender segments, income distribution, market size, infrastructure, geographical/physical distance, market similarity and human resources.
- ii. Political environment, including for example political climate/stability, country risk and corruption.
- iii. Economic environment, including for example economic stability, market growth/development, economic/market intensity, market consumption/middle class, economic freedom, long-term market potential, trade agreements, trade barriers, investment incentives, tax advantages and financial risk factors.
- iv. Socio-cultural environment, including for example cultural distance, psychic distance, language distance, education level and literacy rate.
- v. Sector/product-specific indicators, including for example competitive landscape, customer receptiveness, demand potential and personal values of consumers.
- vi. Firm-specific indicators, including for example strategic orientation of the firm, network relationships, firm entry barriers, motivations for growth and reputation.

Based on a comprehensive review of many international market selection studies, Ozturk et al. (2015) proposed a Foreign Market Opportunity Assessment (FMOA) model which used country responsiveness, growth potential and aggregate market measures.

Czinkota and Ronkainen (2012) proposed a multi-level process model for international market selection involving:

- i. Preliminary screening: This involves doing an initial assessment using typical criteria such as market size, market growth rate, fit between customer preferences and the product, and competitive intensity.
- ii. Identification/in-depth screening: This involves doing an assessment of industry attractiveness and doing forecasts of costs and revenues related to short-listed countries.
- iii. Final selection: This involves arriving at the choice of market that best matches the company's objectives and leverages available resources in the most effective way.

There are many more models available for choosing international markets. The Green and Allaway shift-share model, Papadopoulos et al.'s trade-off model, the International Trade Centre's (ITC) multi-criteria method, the gravity model, the product space network methodology, Canada's Trade Opportunity Matrix and the TRADE-DSM are but a few (Steenkamp et al. 2012).

Cameron et al. (2017: 140) made reference to this growing number of models and frameworks as follows:

"In determining such opportunities, consideration needs to be given to aspects demonstrated by e.g. gravity modelling (the so-called work horse of international trade), such as geographic distance, cost of logistics, market demand characteristics such as size, trends and growth; tariff and non-tariff barriers; competition; comparative advantage; revealed trade advantage; and local production capabilities; to name but a few. All of these aspects carry with them the real world implication of *masses of information and data* that need to be considered by policy and business decision-makers, placing this challenge firmly into the realm of so-called *big data*."

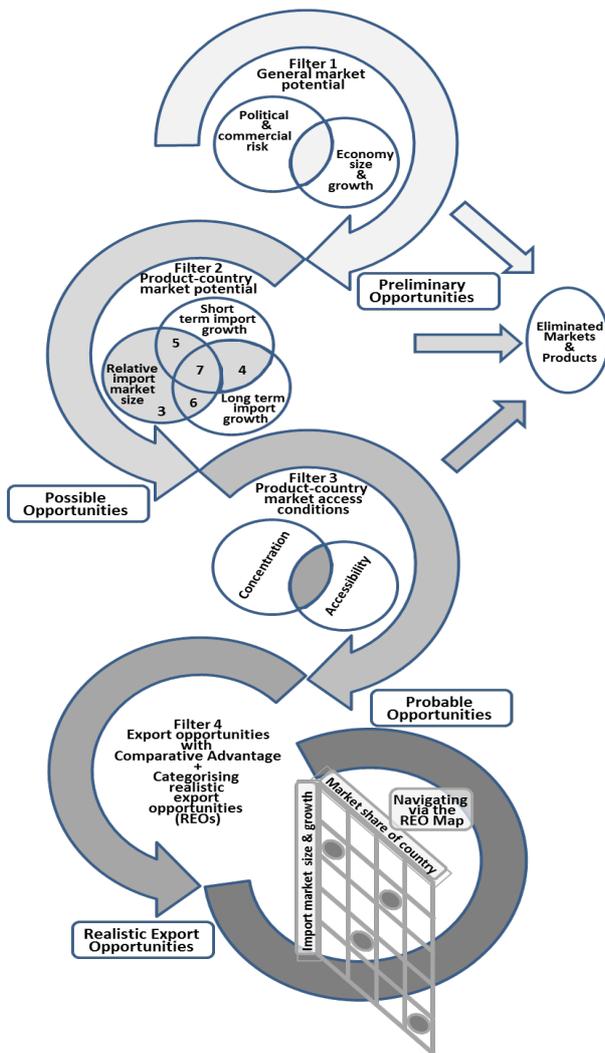


Figure 1 Illustrative overview of the TRADE-DSM methodology. From Cameron and Viviers (2015), adapted from Jeannet and Hennessey (1988: 139).

Kabir and Carayannis (2013) also noted this by writing that many firms understand that there is more knowledge to be gained and more insights to be extracted from available big data.

Therefore, exporters and governments need practical ways of overcoming this big-data challenge – particularly the analytical challenge of identifying the most promising export opportunities (markets and products) from the substantial mass of information that is available. Cameron et al. (2017: 140) put this squarely in the big-data analytics arena, stating:

“What countries therefore need is a practical way of tackling the ‘big data’ challenge in international market selection, i.e. efficiently identifying the most promising export opportunities at a given point in time from the confusing mass of information that is constantly spilling into the public domain in the form of data sets,

research findings, industry and government analyses, and general commentaries.”

3. METHODOLOGY

3.1 Selection of the TRADE-DSM system

There are a few big-data analytics packages designed to help with international market selection decisions. For this, the TRADE-DSM was selected as it was specifically designed for international market selection purposes and has been widely used (Cuyvers et al. 2012b). For example, since 1995, the TRADE-DSM has been applied in various countries, including Belgium, Thailand, Rwanda, the Czech Republic, Greece, Thailand and the USA (at state level – Louisiana), in addition to South Africa (Cameron and Viviers 2017; Oluwade 2018; Jansen van Rensburg et al. 2019). It has also received favourable reviews from the International Trade Centre (ITC 2017) as well as the WTO (see Steenkamp et al. 2016).

The TRADE-DSM methodology was initially developed to find the product–market combinations with the best prospects of export success for a single country, and was primarily aimed at export promotion organisations (see Cuyvers et al. 1995). Since 1995, the TRADE-DSM methodology has been further developed to provide a view of all the potential product–market combinations that national and provincial governments, industry associations, sector groups and exporters are interested in analysing for the purpose of strategic decision-making.

The TRADE-DSM system evaluates global trade data from many sources using built-in analytical programmes that assess trade flows between countries. The system allows users to focus on trade flows of specific products, which are identifiable by detailed, 6-digit international tariff codes. Furthermore, the system provides for the application of various filters to identify those opportunities with the highest product export potential. These filters include macroeconomic environment, operational environment and political risk, size and growth of markets, competition in the market, accessibility of a market, maturity of a market, and the ability or capacity of the home market to supply the export goods (see Figure 1) (Cuyvers et al. 2012a; Trade Advisory 2020).

The international trade data supporting the TRADE-DSM comes from several different sources, such as UN Comtrade, CEPII BACI databases, the Credendo Credit Insurance

Group, the International Monetary Fund (IMF), the International Trade Centre (ITC), the World Bank, the United Nations, shipping companies, GoogleMaps, searates.com and worldfreightrates.com, as well as various country reports and studies. There are approximately 6.3 billion data points in the TRADE-DSM system (Cameron et al. 2017).

“The TRADE-DSM methodology has the ability to reduce vast quantities of data to manageable proportions. It is particularly valuable to those in government and the business sector who are tasked with formulating export growth and diversification strategies but who find the traditional tasks associated with ‘big data’ – i.e. high-volume and sophisticated data collection, processing and analysis – to be unfeasible from a technical or skill perspective.” (Cameron et al. 2017: 140).

3.2 Study methodology

The research was designed to be carried out in three phases: Phase 1 would cover the exploration of the concept, Phase 2 would cover the preliminary interviews and Phase 3 would cover in-depth case studies. This paper reports on the results of Phase 1 and Phase 2 as well as providing one short case study.

3.2.1 Phase 1: Exploration of the concept: October 2019

In Phase 1, interviews were conducted with individuals familiar with the TRADE-DSM to

identify if there was any evidence that the big-data analytics system was used to assist decision-making and to determine if a preliminary model could be developed. Based on these interviews, an interview guide, survey and preliminary model were developed. The interview guide and survey were based on similar types discussed in the competitive intelligence literature (Calof et al. 2017; Fehringer et al. 2006).

3.2.2 Phase 2: Preliminary interviews with users: January 2020

In Phase 2, interviews were held with selected users of the TRADE-DSM and decision-makers who had used the report from the TRADE-DSM (the systems output). To ensure that those interviewed represented active TRADE-DSM users, the researchers identified (using a variety of sources) the most active TRADE-DSM users. Those identified who were available when the research was conducted (January 2020) were interviewed. The individuals selected and interviewed came from:

- i. Firms: Packaging, steel, funeral supplies, beverages, industrial adhesive, infection and hygiene control products;
- ii. An industry association: South African Pork Producers Organisation (SAPPO);
- iii. Provincial trade promotion organisations who had used the TRADE-DSM to help

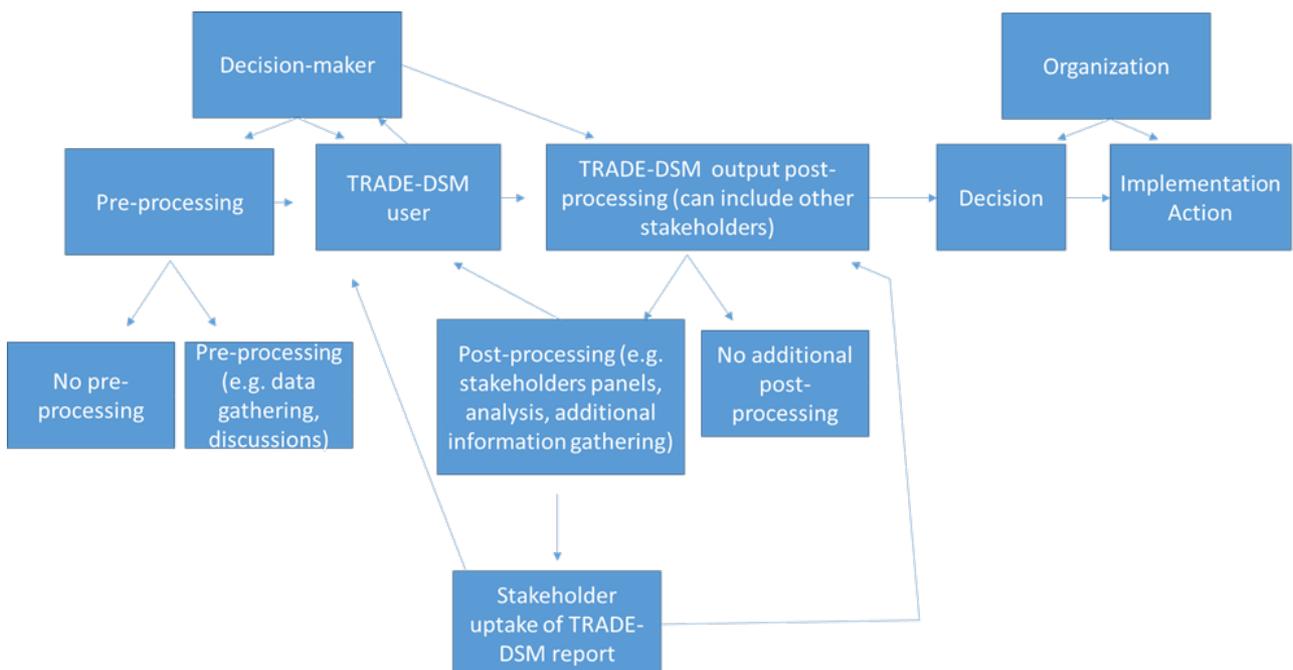


Figure 2 The emerging big-data analytics model for international market selection.

their respective provinces' exporters: Trade & Investment KwaZulu-Natal (TIKZN), Cape Town & Western Cape Tourism, Trade & Investment (WESGRO);

- iv. A national government department: Department of Agriculture, Forestry and Fisheries (DAFF).

3.2.3 Phase 3: In-depth case studies: 2021

In Phase 3, in-depth case studies will be developed from interviews with some of the users of the TRADE-DSM. The objective of these interviews will be to validate the model developed in Phase 2 and to obtain more details on the use of the big-data analytics system and how the results are integrated into decision-making.

4. RESULTS

All of the Phase 1 and most of the Phase 2 interviews yielded direct evidence of the TRADE-DSM having had an impact on international market selection decisions. In this section, we propose a model based on the interviews. The results section ends with a short case study from one of the TRADE-DSM projects that incorporates both the results from the interview and survey given to the decision-maker. In the first part of the results section, we describe the emerging model of international market selection emanating from the Phase 1 and Phase 2 interviews (Figure 2 presents the model). We provide some observations on the multidimensionality of two of the model elements (decision-maker and TRADE-DSM user), followed by a write-up from one of the interviews to demonstrate the proposed model.

4.1 From decision-making need to TRADE-DSM report

The decision-making model starts with a decision-maker who is looking to choose one or more international market(s). Thereafter, it can move through multiple pathways en route to the development of the TRADE-DSM report (big-data analytics output). We observed five pathways in our Phase 1 and Phase 2 interviews:

- i. The decision-maker engages in a pre-processing activity such as preliminary market research and then through

interaction with a TRADE-DSM user receives a TRADE-DSM report.

- ii. The decision-maker goes directly to a TRADE-DSM user and requests a report without having done any pre-processing.
- iii. The decision-maker, having received the TRADE-DSM report, asks for another report using different variables.
- iv. The TRADE-DSM user proactively develops a TRADE-DSM report for the decision-maker without being asked.
- v. The TRADE-DSM user or decision-maker shows the TRADE-DSM report to one of their stakeholders who in turn requests their own report from the TRADE-DSM user.

Regarding pre-processing activities, those interviewed frequently mentioned that their organisation had already commenced the international market selection process. They had gathered information and in some cases had already conducted supporting analysis prior to the production of the TRADE-DSM report. For example, one user talked about having a heat map done on opportunities in Africa for their sector by using credit card data.

4.2 From TRADE-DSM report to decision

From the production of the TRADE-DSM report (big-data analytics output) to an international market selection decision by the decision-maker, we observed two pathways:

- i. The TRADE-DSM report moving directly towards the decision.
- ii. The TRADE-DSM report being further processed by the organisation through a combination of additional data gathering, discussion and analytical processes, after which the decision-maker makes the decision.

Regarding post-processing activities, some of those interviewed mentioned that they used the TRADE-DSM report either as a starting point in their international market selection process or as a mid-point (having done some pre-processing). They then gathered additional information using processes such as stakeholder consultations, expert panels, country visits and attendance at international trade shows to validate and provide additional depth to the information. Many of those interviewed also talked about having further

discussions within their organisation. In those cases, the TRADE-DSM served as one of the inputs in their international market selection decision. This concept of broad information gathering from multiple sources was also found in other recent studies (Søilen 2019; Calof et al. 2017; Calof et al. 2015).

No-one who was interviewed said that the TRADE-DSM report (big-data analytics output) was the sole input in making the international market selection decision. Because of this, the research team developed a questionnaire designed to identify the inputs used to make the international market selection decision, together with the importance of each input.

4.3 From decision to implementation and action

In the Phase 1 and Phase 2 interviews, many commented on the organisational factors influencing whether the decisions emanating from the TRADE-DSM ‘process’ and report were accepted and implemented. Interviewees told us how individuals in their organisation reacted to the TRADE-DSM report and the eventual implementation or rejection of the TRADE-DSM recommendation. In one interview, we were told that senior management welcomed the report as they “want to make fact-based decisions”. We were also told about organisational support in that senior management was already highly supportive of the TRADE-DSM. This kind of orientation towards fact-based decisions and big-data analytics has been reported in past studies (Kabir and Carayannis 2013; Gnizy 2018).

In another interview, we were told that while management was open to the TRADE-DSM findings, the organisation lacked the resources to implement the report’s recommendations. Persaud and Schillo (2017), in a report that synthesised past research on big data and analytics, wrote extensively about organisational or management impediments and the requirements for integrating the results of big-data analytics.

4.4 Recap of TRADE-DSM participants

From the model and discussion above, several TRADE-DSM participant categories were identified:

Decision-maker: An individual who works for an organisation that has an international market decision-making need and requests

and/or receives a TRADE-DSM report (big-data analytics output) as part of their decision-making process.

TRADE-DSM user: A person trained in the use of the TRADE-DSM system. In our study, users were individuals who produced the reports based on an understanding of the international market selection decision that the organisation needed to make. The researchers noted three types of TRADE-DSM user:

1. The in-house TRADE-DSM user. For example, TIKZN-trained TRADE-DSM users produced reports to help TIKZN select priority markets.
2. The outsourced TRADE-DSM user (consultant model). An example was a steel company (the specific case will be described in section 5) that requested and received a TRADE-DSM report from a consultant from Trade Advisory (a consultancy specialising in the application of the TRADE-DSM).
3. The in-house TRADE-DSM user combined with an outsourced user (mixed approach). This approach was sometimes used where an organisation had in-house user capability but also outsourced to a TRADE-DSM consultant. We saw this, for example, in DAFF (a national government department).

Stakeholders: In the DAFF and industry association interviews, we learned that as part of their decision-making process, the individuals in question engaged in a variety of discussions with industry stakeholders and used the TRADE-DSM report as part of these discussions. The industry stakeholders whom we interviewed said that the report also became part of their decision-making process. In some cases, the stakeholder requested a separate TRADE-DSM report focused on their specific product(s) and HS code(s).

Senior management: In some of the interviews, the decision-maker who had requested and/or received the TRADE-DSM report said that while they were able to make a recommendation, the final decision would be made by a more senior individual in their organisation. For example, in one of the organisations (a packaging company), the recommendation had to be discussed with the managing director.

4.5 Multidimensionality of the decision-maker and the TRADE-DSM user

The interviewees made several observations that demonstrated how multidimensional the various elements of the model are. We discuss multidimensionality in terms of both decision-maker and TRADE-DSM attributes below.

4.5.1 The decision-maker

In one of the interviews, the decision-maker told us that the report was neither valuable to them nor used in their decision-making process. The reason the decision-maker gave was that the report did not include the key information that they needed to make an international market selection decision. We asked the decision-maker what information they needed. Upon being told what their requirements were, we told them that the TRADE-DSM could indeed provide such information. The decision-maker's response was: "I am going to ask the [TRADE-DSM] user to produce a report for me with that information." This was in contrast to another decision-maker who had requested several TRADE-DSM reports in the past and not only specified to the TRADE-DSM user what analysis was required but also told us that he knew the model's strengths and weaknesses. We refer to this here because it illustrates the extent to which the decision-maker understood how the TRADE-DSM could help satisfy their decision-making needs. These examples highlight different levels of TRADE-DSM literacy.

The first decision-maker described above had a low level of TRADE-DSM literacy and neither understood how to instruct the TRADE-DSM user to produce the report they needed nor understood what was contained in the report. The second decision-maker had a high level of TRADE-DSM literacy and knew how to use the big-data analytics system. Similar phenomena are evident in the intelligence and foresight field where you hear reference being made to foresight literacy and intelligence literacy (see Calof et al. 2012; Bisson and Tang Tong 2018).

In one of the interviews, the decision-maker talked about all the steps he had taken in making the international market selection decision. This individual described how the TRADE-DSM report had helped to narrow down the international markets and, by conducting interviews with people in the market and attending a trade show, they were

then able to arrive at a final decision. The decision-maker named all the different variables that had gone into the decision. This was in contrast to two other decision-makers whom we interviewed – one did not even open the TRADE-DSM report and had yet to make a final decision and the other referred to the report as overwhelming: "I did not know what I was looking at."

What differentiated the former and the latter decision-makers? It was their grasp of the international market selection process and their experience in selecting optimal markets. We refer to this as decision-maker international market selection experience and knowledge. The international business literature also notes that the extent of international experience will impact decision-making processes (for more on this, see the research conducted on theories surrounding different stages of internationalisation).

4.5.2 The TRADE-DSM user

We interviewed several of the TRADE-DSM users and reviewed many of their TRADE-DSM reports. We noted that some of the users' reports were longer and more comprehensive than others, with additional information having been integrated into the results. Interestingly, some of the users said that they were using the reports in a number of different ways, over and above helping decision-makers choose international markets. For example, one user told us that the TRADE-DSM had been used to prepare the decision-maker for an upcoming trade show. We refer to this as TRADE-DSM user expertise, which we speculate may also have a link to an individual's knowledge and past experience of big-data analytics systems.

We also noted the extent to which the user knew and understood the decision-maker. This became evident in one of the interviews where the decision-maker in question commented that the TRADE-DSM report prepared by a user was not useful. When we asked why, the response was that although the report offered valuable insight into the best markets for the company around the world, the company's rights to market and sell the product were limited to Africa. Therefore, only African countries should have been assessed and ranked in the TRADE-DSM report. We call this user knowledge of the decision-maker and their organisation. A second dimension of the user–decision-maker interface became evident in another interview where the decision-maker

commented that while the TRADE-DSM report was lengthy (which would normally make them decide to ignore it), they nevertheless read the whole document as they trusted the TRADE-DSM user to give them something useful. We term this the decision-maker–user relationship.

5. APPLYING THE TRADE-DSM: A CASE STUDY

The following case illustrates the use of the TRADE-DSM model by a steel producer to select international markets. In describing the case, we refer to the proposed model.

The TRADE-DSM decision-maker was the export manager at a steel-producing company in Africa, which already exported to various African markets but wanted to extend its footprint on the continent. The export manager had been tasked with deciding which additional African markets to select for his company. When attending a social engagement, he met up with a friend (relationship) who was very knowledgeable about and experienced in the use of the TRADE-DSM. His friend told him about the TRADE-DSM system and how it could be used to help him with his decision.

The export manager wanted to know more and requested a demonstration of the TRADE-DSM system. The friend scheduled a meeting with the export manager and his managing director to discuss the TRADE-DSM methodology. After providing an overview of the company and its plans to diversify and expand its export reach into more African countries, the export manager and managing director requested a TRADE-DSM report, which would identify export opportunities for three of the company’s products. The decision-maker (the export manager) was very experienced when it came to international market selection, was highly technical and, at that point, very knowledgeable about the TRADE-DSM. The managing director was at the time very committed to big-data analytics and in fact wanted to make decisions based on big data.

In terms of the model developed (see Figure 2), the user had already done some pre-TRADE-DSM research aimed at selecting new markets in Africa. This pre-processing phase had resulted in fourteen countries being chosen for export expansion consideration. TRADE-DSM identified seven of these countries, and the company decided to do further processing on five of these. This was achieved through

visits to each of these countries, where several interviews were conducted with customers, suppliers and other entities. Three countries were selected and the company successfully entered each one. Further information-gathering took place, including talking to existing customers, company employees, industry experts and expert panels, and industry consultations. In the survey, the decision-maker rated the TRADE-DSM as being very important to making the decision and stated that “The TRADE-DSM did indicate one or two interesting countries in the results as a) being lower than what we would have expected for some countries and b) being surprisingly higher than what we expected in some other countries.”

To summarise, the company was an experienced exporter to a number of African countries and the decision-maker had therefore selected and entered international markets before (experienced). The user had extensive knowledge of the TRADE-DSM and a strong relationship with the decision-maker, and pre-processing had been done. The TRADE-DSM report was further processed on the basis of inputs obtained from in-market visits and interviews and the decision-maker then forwarded the recommendations to his managing director (organisation). The managing director was also committed to the TRADE-DSM and the use of big data (attitude) and the company had the resources to implement the international market selection decision.

6. CONCLUSIONS AND AREAS FOR FUTURE RESEARCH

The objective of this paper was to see if big-data analytics impacted international business decisions. Several of the decision-makers interviewed during Phase 1 and Phase 2 of the study stated that the TRADE-DSM was used to help select international markets, thereby showing a link between big data and analytics and international market selection.

Based on the interviews, a preliminary model was developed (see Figure 2), showing multiple pathways in which big data was used in the international market decision-making process. The model will be examined further and if necessary refined during Phase 3 of the study.

In our interviews, we noted that the TRADE-DSM report was not the only input for the international market selection decision but one of several factors (albeit in the case study a

very important one). The interviews identified both pre-processing and post-processing phases involving the TRADE-DSM report, which led to a final decision being made. Organisational factors, such as management attitudes towards big data, impacted the extent to which the TRADE-DSM report was accepted and used. During the interviews, we also noted several qualities and attributes of the decision-maker and the TRADE-DSM user that appeared to influence the extent to which big-data analytics were used in the international market selection decision-making process.

The observations emanating from the interviews do validate a linkage between big-data analytics and international decisions, and serve to offer some depth to various aspects of the emerging model. The case study that was discussed provided confirmation of the emerging model. However, given the small number of interviews conducted to date, future research should collect more data to validate and deepen these preliminary observations. Surveying more users of the TRADE-DSM system will provide statistical validation of the relationship and possibly also the attributes and mind-sets of both the TRADE-DSM user and TRADE-DSM decision-maker that we have noted in this study.

In addition, more in-depth case studies should be developed. The case study reported on in this paper was based on two 30-minute interviews and a few follow-up emails with the decision-maker. Since the objective is to ultimately fully understand the impact of big-data analytics on the international decision-making process, future research should provide for all TRADE-DSM participants to be interviewed, as identified in Section 4.4, i.e. the decision-maker, the TRADE-DSM user, senior management and, where relevant, other stakeholders. This will provide additional insights and validations.

Finally, from the observations arrived at following the limited number of interviews conducted, we suggest that a more rigorous study be carried out, both to validate the preliminary model findings and to develop a deeper understanding of each element:

a. TRADE-DSM user study: We have speculated, based on the interviews, that the quality of the analytics (TRADE-DSM report) was related to the user's TRADE-DSM experience and knowledge, their experience of big-data analytics in general, their relationship with the decision-maker,

and their knowledge of the decision-maker and their organisation. A future study should investigate these aspects and assess their impact on the quality of the analytics produced. A positive relationship would help in the development of appropriate training programmes for TRADE-DSM users.

b. TRADE-DSM decision-maker study: We have speculated, based on the interviews, that the quality of the analytics (TRADE-DSM report) and its usefulness in the decision-making process are related to decision-maker TRADE-DSM literacy and the decision-maker's knowledge and experience of international market selection decision-making. A future study should look at these aspects and assess their impact.

c. TRADE-DSM processing focused study: We observed both pre-processing and post-processing activities. These should be explored in more detail. Specifically, what analytical techniques are used? What additional information is gathered? What role does each piece play in the process? We have reported on this in the case study, but more research is needed to create a better understanding of how big-data analytics results are processed and their relative importance for the overall decision-making process. If performance measures are used in the study (effectiveness or quality of the final recommendation), then process variables can be linked to performance. This type of research could provide insight into how big-data analytics can be effectively combined with pre- and post-processing.

d. Study on the organisational factors impacting TRADE-DSM report implementation: We heard that organisational factors such as management attitudes towards big data and analytics impacted the organisation's willingness to accept and integrate the TRADE-DSM report. We also heard that organisational factors such as resources impacted the ability to implement TRADE-DSM-based recommendations. A future study should look at how organisational factors impact the big-data analytics process (the emerging model).

e. Study on different kinds of decision-makers' use of the TRADE-DSM: A future study should explore the use of the

TRADE-DSM from the perspectives of government, sector associations, trade promotion organisations and companies. We noted during the interviews that each group had a different perspective and a different set of decisions influencing the application of the same big-data analytics system.

f. Study on the different kinds of decisions supported by the TRADE-DSM:

The objective of the study was to look at how big-data analytics (TRADE-DSM) impacted international market selection decisions. The TRADE-DSM was specifically designed for this purpose. However, we noted in the interviews that the TRADE-DSM was also used to inform other decisions. For example, we saw it used to help companies prepare for trade shows, to help companies determine what products to export (and how to classify them) and to support HS-code reclassification requests. Thus, other international decisions arising from the TRADE-DSM should be examined in another study. These would be secondary benefits stemming from the big-data analytics system.

7. REFERENCES

- Bisson, C. and Tang Tong, M.M. 2018. Investigating the competitive intelligence practices of Peruvian fresh grapes exporters. *Journal of International Studies in Intelligence Studies* 8(2): 43–61.
- Calof, J. 1997. So you want to go international? What information do you need and where will you get it? *Competitive Intelligence Review* 8(4): 19–29.
- Calof, J., Arcos, R. and Sewdass, N. 2017. Competitive intelligence practices of European firms. *Technology Analysis and Strategic Management* 30(3): 1–14.
- Calof, J. and Lane, H. 1988. So You Want To Do Business Overseas? Or Ready, Fire, Aim. *Business Quarterly* (3): 52–57.
- Calof, J., Miller, R. and Jackson, M. 2012. Towards impactful foresight: Viewpoint from foresight consultants and academics. *Foresight* 14(1): 82–97.
- Calof, J., Mirabeau, L. and Richards, G.S. 2015. Towards an Environmental Awareness Model Integrating Formal and Informal Mechanisms – Lessons from the Demise of Nortel. *Journal of Intelligence Studies in Business* 5(1): 57–69.
- Cameron, M.J. and Viviers, W. 2015. Realistic Export Opportunity Analysis for Agricultural Products in the Major Group: HS08 – Edible fruit and nuts; peel of citrus fruit or melons. Study report prepared by TRADE (Trade and Development) research focus area, North-West University for Department of Agriculture, Forestry and Fisheries, South Africa.
- Cameron, M.J. and Viviers, W. 2017. Using a Decision Support Model to identify export opportunities: Rwanda. Technical Study Report (F-38410-RWA-1) for the International Growth Centre (IGC). Project code: 1-VCT-VRWA-VXXX-38410. Available at: <https://www.theigc.org/project/using-decision-support-model-identify-export-opportunities-rwanda/>. Date of access: 5 March 2020.
- Cameron, M.J., Viviers, W. and Steenberg, V. 2017. Identifying realistic export opportunities for Rwanda based on the TRADE-DSM approach. Policy brief 38410. International Growth Centre (IGC). Project code: 1- VCT-VRWA-VXXX-38410. Available at <https://www.theigc.org/project/using-decision-support-model-identify-export-opportunities-rwanda/> Date of access: 10 March 2020.
- Cuyvers, L., de Pelsmacker, P., Rayp, G. and Roozen, I.T.M. 1995. A decision support model for the planning and assessment of export promotion activities by government export promotion institutions: the Belgian case. *International Journal of Research in Marketing* 12 (2): 173–186.
- Cuyvers, L., Steenkamp, E.A. and Viviers, W. 2012a. The methodology of the Decision Support Model (DSM). In L. Cuyvers and W. Viviers (eds), *Export Promotion: A Decision Support Model Approach*. Stellenbosch: Sun Media Metro.
- Cuyvers, L., Viviers, W., Sithole-Pisa, N. and Kuhn, M.L. 2012b. Developing strategies for export promotions using a decision support model: South African case studies. In L. Cuyvers and W. Viviers (eds), *Export Promotion: A Decision Support Model Approach*. Stellenbosch: Sun Media Metro.
- Cuyvers, L. and Viviers, W. (eds). 2012. *Export Promotion: A Decision Support Model Approach*. Stellenbosch: Sun Media Metro.

- Czinkota, M. R. and Ronkainen, I.A. 1998. *International marketing*. Fort Worth, TX: Dryden Press.
- Czinkota, M.R. and Ronkainen, I.A. 2012. *International Marketing*, 10th edition. South-Western.
- Fehringer, D., Hohhof, B. and Johnson, T. (eds). 2006. *State of the art competitive intelligence*. Competitive Intelligence Foundation Research Report, Society of Competitive Intelligence Professionals, Alexandria, VA.
- FITA. Federation of International Trade Associations. www.fita.org/webindex.html Date of access: 20 March 2020.
- Gapminder. www.gapminder.org Date of access: 20 March 2020.
- Globalede. <https://globalede.msu.edu/> Date of access: 20 March 2020.
- Gnizy, I. 2018. Big data and its strategic path to value in international firms. *International Marketing Review*. DOI: 10.1108/IMR-09-2018-0249.
- Hughes, S.F. 2017. A new model for identifying emerging technologies. *Journal of Intelligence Studies in International Business* 7(1): 79–86.
- ITC. 2017. http://exportpotential.intracen.org/media/1089/epa-methodology_141216.pdf Date of access: 20 March 2020.
- Jansen van Rensburg, S.J., Viviers, W., Cameron, M.J. and Parry, A. 2018. Identifying export opportunities between IORA member states using the TRADE-DSM® methodology: a case study involving South Africa and Thailand. *Journal of the Indian Ocean Region*, DOI: 10.1080/19480881.2018.1521777.
- Jeannet, J.P. and Hennessey, H.D. 1998. *International marketing management: strategies and cases*. Boston: Houghton Mifflin.
- Johanson, J. and Vahlne, J.E. 1990. The Mechanism of Internationalization. *International Marketing Review* 7(4): 11–24.
- Kabir, N. and Carayannis, E. 2013. Big Data, Tacit Knowledge and Organizational Competitiveness. *Journal of Intelligence Studies in Business* 3: 54–62.
- Katsikeas, C.S. and Morgan, R.E. 1994. Differences in Perceptions of Exporting Problems Based on Firm Size and Export Market Experience. *European Journal of Marketing* 28(5): 17–35.
- Kühn, M.L. and Viviers, W. 2012. Exporters' information requirements: competitive intelligence as an export promotion instrument. In Cuyvers, L. and Viviers, W. (eds), *Export Promotion: A Decision Support Model Approach*. Stellenbosch: Sun Media, pp. 229–251.
- Lederman, D., Olarreaga, M. and Payton, L. 2006. Export promotion organisations: what works and what does not. *Trade Note* 30, World Bank Group, Washington D.C.
- Lederman, D., Olarreaga, M. and Zavala, L. 2016. Export promotion and firm entry into and survival in export markets. *Canadian Journal of Development Studies / Revue* <https://doi.org/10.1080/02255189.2016.1131671>.
- Leonidou, L.C. 2004. An Analysis of the Barriers Hindering Small Business Export Development 42(3): 279–302.
- Los, B., Timmer, M.P. and De Vries, G.J. 2015. How important are exports for job growth in China? A demand side analysis. *Journal of Comparative Economics* 43: 19–32.
- Oluwade, B.B. 2018. An Application of the Decision Support Model to Louisiana's Exports. *The International Journal of Social Sciences and Humanities Invention* 5(01): 4307–4313.
- Ozturk, A., Joiner, E. and Cavusgil, S.T. 2015. Delineating Foreign Market Potential: A Tool for International Market Selection. *Thunderbird International Business Review* 57(2): 119–141.
- Persaud, M. and Schillo, S. 2017. *Big analytics: Accelerating innovation and value creation*. Report, Telfer School of Management, University of Ottawa, Canada, p. 27.
- Reid, S.D. 1981. The decision maker and export entry and expansion. *Journal of International Business* 12: 101–112.
- Søilen, K.S. 2019. How managers stay informed about the surrounding world. *Journal of Intelligence Studies in Business* 9(1): 28–35.
- Souchan, A.L., Dewsnap, B., Durden, G.R., Acin, C.N. and Holzmuller, H.H. 2015. Antecedents to export information generation: a cross-national study. *International Marketing Review* 32(6): 726–761.
- Souchon, A.L. and Diamantopoulos, A. 2000. Enhancing export performance through

- effective use of information. Research paper (Sept), Aston Business School.
- Steenkamp, E., Grater, S. and Viviers, W. 2016. Streamlining South Africa's export development efforts in Sub-Saharan Africa: A Decision Support Model Approach. In R. Teh, M. Smeets, M. Sadni Jallab and F. Chaudhri (eds), Trade costs and inclusive growth: Case studies presented by WTO chair-holders. Geneva, Switzerland: WTO publications, pp. 49–82.
- Steenkamp, E., Viviers, W. and Cuyvers, L. 2012. Overview of international market selection methods. In L. Cuyvers and W. Viviers (eds), Export Promotion: A Decision Support Model Approach. Stellenbosch: Sun Media, pp. 27–49.
- Trade Advisory. 2020. www.tradeadvisory.co.za. Date of access: 10 April 2020.
- Wiedersheim-Paul, F., Olson, H.C. and Welch, L.S. 1976. Pre-export activity: the first step in Internationalisation. *Journal of International Business Studies* 9(1): 47–58.
- World Economic Forum (WEF). 2016. Global Enabling Trade Report 2016. A joint publication of the World Economic Forum (www.weforum.org) and the Global Alliance for Trade Facilitation. ISBN: 978-1-944835-06-4. <http://wef.ch/getr16>. Date of access: 3 March 2020.