International Market Selection for Livestock Producers: hierarchical modeling for prioritizing economic stability, logistics, and culture.

Seleção de Mercados Internacionais para Pecuária: Priorizando Estabilidade Econômica, Logística e Cultura.

Received: 10-02-2024 | Accepted: 15-03-2024 | Published: 21-03-2024

Renata Melo e Silva de Oliveira  
ORCID: https://orcid.org/0000-0002-1904-7533  
Universidade do Estado do Pará, Brazil  
E-mail: renata.oliveira@uepa.br

Iedo Souza Santos  
ORCID: https://orcid.org/0000-0003-2563-3245  
Universidade do Estado do Pará, Brazil  
E-mail: iedio@uepa.br

Marcelo José Raiol Souza  
ORCID: http://orcid.org/0000-0001-5998-5041  
Universidade do Estado do Pará, Brazil  
E-mail: mraiolsouza@uepa.br

Gabriel Correia Bandeira  
Universidade do Estado do Pará,Brazil  
Universidade da Amazônia, Brazil  
E-mail: gcorreabandeira@gmail.com

ABSTRACT

This study provides a guide for Brazilian livestock producers seeking to expand into European or Asian markets, aligning with EU and Islamic regulations. Key performance indicators were collected for major markets between 2020 and 2023, using the Analytic Hierarchy Process (AHP) to prioritize criteria such as economic stability, logistics, culture, and market attractiveness. The results emphasize the importance of economic stability and GDP growth in market selection, demonstrating the utility of AHP for livestock producers in international expansion decisions.

Keywords: Analytic Hierarchy Process; Decision support; International market selection; livestock.

RESUMO

Este estudo oferece um guia para produtores de gado brasileiros que buscam expandir para os mercados europeu ou asiático, alinhando-se às regulamentações da UE e islâmicas. Indicadores-chave de desempenho foram coletados para os principais mercados entre 2020 e 2023, utilizando o Processo Hierárquico Analítico (AHP) para priorizar critérios como estabilidade econômica, logística, cultura e atratividade de mercado. Os resultados destacam a importância da estabilidade econômica e do crescimento do PIB na seleção de mercado, demonstrando a utilidade do AHP para produtores de gado em decisões de expansão internacional.

Palavras-chave: Processo Analítico Hierárquico; Apoio à decisão; Seleção de mercados internacionais; pecuária
INTRODUCTION

The globalization of agricultural markets presents opportunities and challenges for Brazilian livestock producers seeking expansion. International market selection (IMS) is a complex decision-making process, requiring producers to balance economic prospects, logistical efficiencies, and cultural compatibility in light of diverse regulations within the European Union (EU) and Islamic countries. Environmental concerns surrounding livestock production, as well as animal welfare standards, add further complexity to the decision-making process (EU, 2022; MARTINS, 2021; PRAVETTONI, 2016).

The contemporary focus on responsible supply chains within international trade demands a multifaceted approach to IMS (AZADI et al., 2015). Sustainability, ethical practices, and demonstrable resilience to market shocks and climate-related disruptions are becoming essential considerations (FAO, 2020; OECD/FAO, 2016). Consequently, Brazilian producers require structured decision-making tools to navigate these complexities and confidently select markets that align with their long-term goals (HOLLAND, 2019).

This research proposes the use of the Analytic Hierarchy Process (AHP) as a systematic methodology for evaluating potential international markets for Brazilian livestock producers. AHP provides a framework to analyze multiple weighted criteria, facilitating informed and data-driven decision-making (SAATY, 1977; SAATY; VARGAS, 2012). This study develops a Composite Indicator for International Market Selection ($IC_{IMS}$), aggregating key performance indicators (KPIs) across three essential dimensions for the livestock sector. These criteria dimensions are: 1) economic stability & growth, 2) logistics, and 3) culture. The $IC_{IMS}$ offers a practical tool to rank potential markets based on their alignment with the priorities of Brazilian livestock producers.

To construct the $IC_{IMS}$ and guide its application, this study follows a rigorous multi-step methodology. First, a theoretical framework is established by drawing on relevant literature, exploring expert insights, and identifying KPIs. Data on chosen KPIs is collected for several pre-selected markets. AHP is then employed to determine weights reflecting the relative importance of criteria and sub-criteria, as defined by a large Brazilian livestock producer (the decision-maker). Finally, individual market scores are aggregated into the $IC_{IMS}$, leading to a ranking of potential markets based on their composite performance.
This research contributes to the field by offering a structured decision support tool for Brazilian livestock producers and demonstrating the practical application of the CI-IMS in ranking potential international markets. Additionally, it highlights the importance of considering sustainability and ethical practices alongside traditional economic and logistical considerations within the 21st-century IMS context.

**INTERNATIONAL MARKET SELECTION (IMS)**

International Market Selection (IMS) is considered a cornerstone of global business expansion. The process requires identifying and evaluating potential markets and aligning strategic goals with destinations. On the one hand, there is a range of econometrics-based theoretical models (e.g., Matrix of International Market Selection, Uppsala, Born Global) and practical techniques (e.g., market research, trade shows, government resources) developed between the 1960s and 2010s. On the other hand, decision-making of this sort demands analysis of factors including some contextual criteria such as cultural compatibility, regulatory landscapes, and product demand (CAHILL; KRISTI, 1979).

The European Committee's guidance underscores a multicriterial approach, commencing with assessing GDP growth, risk, and proximity, followed by an in-depth analysis considering cultural similarity, market appeal, and potential operational complexities. Some of the considerations recommended by the literature include the following recommendations described in the next paragraphs.

**Recommendation one: seek sustainability and responsible supply chains.** In the modern era, prioritizing social and environmental responsibility is crucial. Integrating sustainable supplier selection methodologies (AZADI et al., 2015) can ensure alignment with ethical practices and the goals outlined by the OECD/FAO (2016), which include decent work conditions, human rights protection, food security, responsible natural resource access, good governance, environmental safeguards, and the adoption of clean technologies.

**Recommendation Two: assess uncertainty and risk.** Real-world international markets are subject to uncertainties. Incorporating methodologies that explicitly address uncertainty adds robustness to IMS. Fuzzy modeling (ALIEV et al., 2022; AZADI et al., 2015; ZHOU et al., 2016), grey decision theory (TSENG et al., 2004), and case-based reasoning (CBR) (CHOU, 2008, 2009; SOTO; ADEY, 2015; WU et al., 2023) offer tools for analyzing risks and historical scenarios, improving decision-making.
Recommendation three: Market Potential Within the Circular Economy. Frameworks dedicated to estimating market potential for circular economy initiatives would contribute significantly to IMS (Wu et al., 2023). These may combine techniques like clustering analysis and multi-criteria decision-making for better targeting and selection of expansion opportunities.

Recommendation four: fostering strong networks and partnerships. Research demonstrates the interplay between causal and effectual logic in how firms make internationalization decisions, influencing performance outcomes (CHETTY; MARTÍN MARTÍN; BAI, 2024). A network-based approach to IMS fosters collaboration, resource sharing, and risk mitigation.

Recommendation Five: assess firm size, entry modes, and performance in doing business. Understanding a firm's scale and its relationship to internationalization patterns is essential. Export channels, whether direct or indirect, impact performance metrics like pricing power, volume, and market diversification (FERNÁNDEZ-OLMOS; MA; FLORINE, 2024; WESTHEAD; WRIGHT; UCBAASARAN, 2002). Firms may need to tailor strategies based on their size and the specific characteristics of target markets.

As a conclusion, IMS is considered in the literature a multi-faceted process. It can benefit from undertaking a criteria framework based on legitimacy and regulations. Also, it is recommended that 21st-century producers take into consideration some sustainability principles, data-driven techniques for uncertainty management, a network perspective, and recognition of the impact of firm characteristics to improve the likelihood of successful global expansion.

DEFINITIONS OF COMPOSITE INDICATORS

Composite Indicators (CI) are an aggregate measure of several sub-indicators compiled to support complex assessments (OLIVEIRA; ZANELLA; CAMANHO, 2020). They are considered important for providing a view of the big picture without loss of relevant information. Examples of Composite indicators include the Human Development Index (DESPOTIS, 2005), The Dow Jones (ROBECOSAM, 2013) Sustainability Index, and the corporate Social Responsibility Index (OLIVEIRA; ZANELLA; CAMANHO, 2019).

The IMS Key Performance Indicators (KPIs) considered in the assessment enable monitoring of the market attractiveness and potential advantages. There are several steps to be considered when a CI is specified to ensure relevance, reliability, and robustness of
a CI. According to the OECD, there are eight main steps to be adopted are the following (NARDO et al., 2008). The process starts by the construction of the theoretical framework. This is the foundation of the CI. It involves preliminary data collection and exploring the literature define criteria selection, a clear multidimensional definition of the measured phenomenon assessed. It also involves subgrouping indicators and variables. Stakeholder involvement is recommended to make the construction process more relevant to society and to model preferences and values judgment as well. The second step is collecting data, running statistics analysis and addressed anomalies. Missing data is addressed as well. The effect of imputation on results is meticulously assessed. Third step is multivariate analysis reveals the dataset's underlying structure, informing subsequent methodological choices. The fourth step is the normalization procedure. It must align with the theoretical framework, dataset properties, and the problem's unique context, potentially involving scale adjustment for variable comparability. The fifth and sixth steps are respectively weighting and aggregation are also guided by the theoretical framework, factoring in data properties for appropriate indicator correlation. The seventh step is uncertainty and sensitivity analyses to gauge the CI's robustness. Finally, the eighth step is communicating results and providing visualization to facilitate transparent, data-driven decision-making.

**METHODOLOGY**

The theoretical framework proposed assesses potential countries for international market performance to be assessed. Individual Key Performance Indicators (KPIs) and their associated weights should reflect the relative importance and overall dimensions of the composite, rather than simply relying on available indicators (NARDO et al., 2008). While some economy KPIs are considered consolidated (e.g., GDP growth), newly emerging policy areas may lack robust foundations (e.g., regard to culture aspects).

Therefore, transparency is crucial in developing credible KPIs. Input and output KPIs should be differentiated to ensure accuracy, with a focus on aligning indicators with the intended measurement objectives. The framework specified within this research considers three IMS criteria recommended by specialized organizations and scholars. The sub-criteria are represented by the KPIs, which were developed accordingly to reflect multiple aspects of IMS. Table 1 reports four desirable outputs KPIs ($y_r$, $r = 1, \ldots, r$) to me maximized and three undesirable outputs ($B_q$, $q = 1, \ldots, q$) to be minimized.
Table 1– KPIs Framework

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>KPIS INDICES</th>
</tr>
</thead>
</table>
| **C1. ECONOMIC STABILITY & GROWTH** (EUROMONEY, 2023; WORLD BANK, 2020A, 2023) | GDP Growth ($y_1$)  
The Doing Business ($y_2$)  
Country Risk ($b_1$) |
| **C2. LOGISTICS** (NARDO et al., 2008; WORLD BANK, 2023) | Geographic Proximity ($b_2$)  
Operational Difficulties($b_3$) |
| **C3. CULTURE** (EC, 2021; GEVA; HANSON, 1999) | Cultural Similarity ($y_3$)  
The Market Appeal ($y_4$) |

Source: THE authors (2024)

All KPIs must be unit invariant indexes so that they can be aggregated into one single measure of performance to support decisions on international market selection. To cope with this rationale, desirable outputs $y_r$ must be normalized. The procedure adopted in this research is $Y_{rj} = \frac{y_{rj}}{y_{rmax}}$ This procedure is based on recommendations of Nardo et al. (NARDO et al., 2008) to ensure that preventing KPIs with scores equal zero. Regarding the undesirable outputs, the normalization adopted is the following: $Y_{qj} = 1 - \frac{b_{qj}}{b_{qmax}} + 0.1$. In both cases, the scales range from 0.1 to 1.

The IMS Composite Indicator ($CI_{IMS}$) based on AHP

The aggregation method adopted to estimate the composite indicators for IMS is the Analytical Hierarchical Process (AHP). This method enables the formulation of a problem considering criteria, sub-criteria, and attributes to ranking alternatives. AHP estimates a system of weights used to aggregate the KPIs in the IMS framework. This method is recommended by the “Handbook on Constructing Composite Indicators” of The Organization for Economic Cooperation and Development (OECD) (NARDO et al., 2008).

There is a large body of literature on the performance of assessment-based AHP in a range of fields or instances, eco-efficiency of smart cities (ZHU; LI; FENG, 2019); Estimation of EPI (DEDEKE, 2013), Sustainability of higher education institutions (ADENLE et al., 2021), assessment involving Rivers Morphology (GHOSH; MAITI,
and the Location problems of Field Hospitals during the Covid-19 Pandemic (OLIVEIRA; SAMPAIO, 2021).

Then, a decision-maker must proceed with pair-wise comparisons (PWC). The fundamental scale (1-9) to determine their specific priorities is represented by ratio scales (SAATY; VARGAS, 2012). This fundamental scale enables accommodating a certain level of indifference and inconsistency as well. The Consistency Index (σ), i.e., \( \sigma = \frac{\lambda_{max} - n}{n-1} \) is calculated to verify the reliability of the AHP system of weights. CI considers de maximal eigen normalized value (\( \lambda_{max} \)) and the number of criteria involved in the problem (n). Finally, the consistency ratio (\( \phi \)) is calculate to assess the feasibility of \( \sigma \). The consistency ratio is given by \( \phi = \frac{\sigma}{\text{Random Index (RI)}} \). If, \( \phi \leq 0.10 \) the hierarchical problem is considered relatively consistent and the set of weights are acceptable.

Once the system of weights is considered feasible, the scores of the composite indicator for international market selection (\( CI_{IMS} \)) are calculated and the market are ranked according to their performance.

APPLICATION

Description of the Decision Problem

To depict the applicability of the methodology proposed, this section reports an exercise of IMS of Brazilian livestock based on the Composite Indicator specified for this purpose. The decision-maker (DM) of this real data-based hierarchical problem is a large producer located in the state of Mato Grosso (MT), Pantanal region. This particular producer intends to select international markets to expand their business to both the European and Asian continents. To achieve this goal, de DM is expected to comply with the regulations of both the European Union and Islamic countries regarding breeding, slaughtering, and transportation procedures.

Since the decision problem lies in selecting the markets with the more attractive features to the interests of this producer, five countries were pre-selected by the DM during a non-structured interview. By the occasion, the framework proposed was validated by the same DM. Next, the KPI data collection focused on gathering information on the five markets defined during the pre-selection, namely Germany, Belgic, France, United Arab Emirates, and Turkey. Then, a pairwise comparison (PWC) involving the framework criteria and the KPIs was conducted using a digital survey with the DMS. The results of these procedures are reported in the next subsections.
Data Collection

The collection of data for calculating the KPIs comprising the International Market Selection (IMS) Composite indicator of Brazilian livestock used as a source the World Bank Open Data and the period spanned from 2020 to 2023. Also, the dataset preparation involved a comprehensive review of the methodologies involving the third part verification and data treatment approaches applied in the data by the manual of WORLD Bank (2020b, 2024), including government reports, market research reports, and trade associations, to ensure validation from third parties and adherence to recommended criteria in the literature (CULTURE, 2021; EUROMONEY, 2023; INDEX, 2021; INSIGHTS, 2021; PROXIMITYONE, 2021; UNIT, 2021). Table 2 reports the normalized Indices calculated using the data collected. Note that the undesirable outputs are rescaled.

<table>
<thead>
<tr>
<th>MARKETS</th>
<th>Y₁</th>
<th>Y₂</th>
<th>Y₃</th>
<th>Y₄</th>
<th>Y₅</th>
<th>Y₆</th>
<th>Y₇</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERMANY</td>
<td>0.724</td>
<td>0.950</td>
<td>0.645</td>
<td>0.284</td>
<td>0.732</td>
<td>0.680</td>
<td>0.960</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>0.828</td>
<td>0.890</td>
<td>0.537</td>
<td>0.356</td>
<td>0.343</td>
<td>0.900</td>
<td>0.910</td>
</tr>
<tr>
<td>FRANCE</td>
<td>0.851</td>
<td>0.930</td>
<td>0.537</td>
<td>0.380</td>
<td>0.343</td>
<td>0.850</td>
<td>0.950</td>
</tr>
<tr>
<td>UNITED ARAB EMIRATES</td>
<td>0.2644</td>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.732</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TURKEY</td>
<td>1</td>
<td>0.930</td>
<td>0.334</td>
<td>0.252</td>
<td>0.01</td>
<td>0.9</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: The Authors (2024)

Table 2 reports the normalized Indices calculated using the data collected. The undesirable outputs are rescaled. Taking KPI Geographic Proximity ($b_2$) as an illustrative example, the methodological procedures performed are as follows to ensure comparability. The origin point is Santos Port in the Brazilian state of Sao Paulo and the destination are the nearest port in the destination market for all shipments. Hamburg (Germany: 10200 km), La Havre (France: 9000km), Antwerp (Belgium: 9300) Jebel Ali (UAE: 12000km), and Istanbul (Turkey: 10600km). For instance, the geographic distance index from Brazil to the Belgium was calculated as follows: $Y_{4-Belgium} = 1 - \left(\frac{9300}{12000}\right) + 0.1 = 0.343$. 

<table>
<thead>
<tr>
<th>MARKETS</th>
<th>Y₁</th>
<th>Y₂</th>
<th>Y₃</th>
<th>Y₄</th>
<th>Y₅</th>
<th>Y₆</th>
<th>Y₇</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERMANY</td>
<td>0.724</td>
<td>0.950</td>
<td>0.645</td>
<td>0.284</td>
<td>0.732</td>
<td>0.680</td>
<td>0.960</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>0.828</td>
<td>0.890</td>
<td>0.537</td>
<td>0.356</td>
<td>0.343</td>
<td>0.900</td>
<td>0.910</td>
</tr>
<tr>
<td>FRANCE</td>
<td>0.851</td>
<td>0.930</td>
<td>0.537</td>
<td>0.380</td>
<td>0.343</td>
<td>0.850</td>
<td>0.950</td>
</tr>
<tr>
<td>UNITED ARAB EMIRATES</td>
<td>0.2644</td>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.732</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TURKEY</td>
<td>1</td>
<td>0.930</td>
<td>0.334</td>
<td>0.252</td>
<td>0.01</td>
<td>0.9</td>
<td>1</td>
</tr>
</tbody>
</table>
Survey with livestock producers to estimate the set of weights

The set of weights obtained is derived from the decision-maker’s (DM) preferences collected via PWC. This procedure was conducted in steps introduced by Thomas Saaty (SAATY, 2006). After three interactions with the producer, a consistent set of weights was estimated. They are reported in Table 3.

Table 3 - Consistent set of weights from the survey

<table>
<thead>
<tr>
<th>CRITERIA ( p_c )</th>
<th>SUB-CRITERIA ( w_r )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C1. ECONOMIC STABILITY &amp; GROWTH</strong> ( p_1 = 47.9% )</td>
<td>GDP Growth ( w_1 = 55% )</td>
</tr>
<tr>
<td></td>
<td>The Doing Business Index ( w_2 = 21% )</td>
</tr>
<tr>
<td></td>
<td>Country Risk score ( w_3 = 24% )</td>
</tr>
<tr>
<td></td>
<td>Geographic Proximity ( w_5 = 16.7% )</td>
</tr>
<tr>
<td><strong>C2. LOGISTICS</strong> ( p_2 = 45.8% )</td>
<td>Operational Difficulties ( w_6 = 83.3% )</td>
</tr>
<tr>
<td></td>
<td>Cultural Similarity ( w_7 = 66.7% )</td>
</tr>
<tr>
<td><strong>C3. CULTURE</strong> ( p_3 = 6.3% )</td>
<td>The Market Appeal ( w_8 = 33.3% )</td>
</tr>
</tbody>
</table>

Source: The Authors (2024)

At the first level of the hierarchical problem, a consistency Index \( \phi = 0.2\% \) was obtained during the estimation of the weights \( p_c \). The Consistency Index for the weights within the “logistics” sub-criteria were \( \phi = 1.9\% \). the PWC of sub-criteria of “Economic Stability & growth” and “culture” have Index \( \phi = 0 \) by definition.

The priorities of the decision-maker producer participating in this study indicates that “Economic Stability & Growth” was evaluated of the utmost importance criterion (47.9%). Within this criterion, “GDP Growth” emerged as a high priority, accounting for 55% of the overall weight. “Doing Business” and “Country Risk” were assigned medium priorities, with weights of 21% and 24% respectively. In terms of “Logistics”, which held a weight of 45.8%, “Operational Difficulties” were identified as a high priority (83.3%), whereas “Geographic Proximity” was considered of low priority (16.7%). “Cultural factors”, representing the criterion of Culture (6.3%), demonstrated that Cultural Similarity was accorded a medium priority (66.7%), while “Market Appeal” was given a lower priority (33.3%).
Assessing and ranking alternatives

Table 4 reports the aggregation of scores and the ranking of alternatives derived from this research. The Composite indicator for international market selection ($CI_{IMS}$) is obtained by aggregating the KPIs and their respective sub criteria weights ($w$) at a first stage of aggregation. After that the sub criteria scores are aggregated using their respective criteria weights ($p$).

The $IC_{IMS}$ scores for this decision problem are calculated according to the following expression:

$$CI_{IMS} = p_1[(w_1 \times Y_1) + (w_2 \times Y_2) + (w_3 \times Y_3)] + p_2[(w_4 \times Y_4) + (w_5 \times Y_5)] + p_3[(w_6 \times Y_6) + (w_7 \times Y_7)]$$

Taking as an example the assessment of United Arab Emirates, $CI_{IMS} = 0.479 \times (0.55 \times 0.2644) + (0.21 \times 1.00) + (0.24 \times 0.1) \times (0.333 \times 1) = 0.2429461$.

### Table 4- Results and Ranking

<table>
<thead>
<tr>
<th>RANKING</th>
<th>C1. ECONOMIC STABILITY &amp; GROWTH</th>
<th>C2. LOGISTICS</th>
<th>C3. CULTURE</th>
<th>$IC_{IMS}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERMANY (4)</td>
<td>0.75260829</td>
<td>0.20226</td>
<td>0.77036</td>
<td>0.50166733</td>
</tr>
<tr>
<td>BELGIUM (3)</td>
<td>0.7709589</td>
<td>0.188338</td>
<td>0.9006</td>
<td>0.51228614</td>
</tr>
<tr>
<td>FRANCE (2)</td>
<td>0.79200258</td>
<td>0.192346</td>
<td>0.88045</td>
<td>0.52293228</td>
</tr>
<tr>
<td>UAE (5)</td>
<td>0.3578023</td>
<td>0.0191</td>
<td>0.997</td>
<td>0.2429461</td>
</tr>
<tr>
<td>TURKEY (1)</td>
<td>0.82553784</td>
<td>0.122322</td>
<td>0.9303</td>
<td>0.51006493</td>
</tr>
</tbody>
</table>

Source: the Authors (2024)

Based on Table 4, country ranking for the international market selection is the following. Turkey (#1) is the top-ranked country, primarily due to its strong performance in the Economic Stability & Growth criterion (C1). This trending expansion of economy suggests favorable economic conditions for livestock cattle market expansion. France (#2) also demonstrating balance of economic factors and strong cultural similarity (C3) with Brazil. Belgium (#3) follows closely to positions #1 and #2, also exhibiting cultural compatibility and moderate expansion of economy. Germany (#4) holds leading logistical advantages (C2), its overall performance is slightly lower compared to the top three countries and the economy is considered stable as the expansion and is considered stability is moderate to high. The United Arab Emirates (#5), UAE, ranks last, suggesting that despite the economic strengths, logistical and business cultural aspects might pose challenges for the Brazilian livestock cattle market.
Regarding additional insights that can be extracted from the data reported in Table 4. For the DM, the criterion Economic Stability & Growth (C1) appears to be the most important criterion, significantly influencing the ranking results. Also, countries with higher cultural similarity and market appeal (e.g., France and Belgium) demonstrate the value of cultural fit in international market selection.

From another standpoint, despite logistical efficiency is considered a highly important feature in the international business field, this particular DM assessed this criterion as less pronounced compared to economic and cultural factors in this analysis conducted.

**Recommendation for the DM**

The $IC_{IMS}$ analysis suggests that Turkey should be a strong contender for market expansion within the Brazilian livestock cattle producer from Mato Grosso do Sul, Pantanal. This is primarily due to its favorable economic growth prospects. However, to ensure long-term success, it is recommended to balance economic potential with cultural considerations to foster long-term trade relationship. France and Belgium exhibit greater cultural similarity with Brazil, potentially facilitating smoother market entry and business operations. Additionally, a diversified investment strategy across several ranked countries can mitigate risks associated with single-market dependency. This diversification should weigh economic, logistical, and cultural factors for optimal results.

Importantly, the CI rankings are derived from the specific weights and assumptions within the model. Engaging in discussions with relevant decision-makers is vital to ensure the alignment of these findings with the broader strategic priorities of the producers. Therefore, a sensitivity analysis is recommended to explore further decision scenarios.

**CONCLUSIONS**

The study explored the strategic alignment when an agribusiness producer pursues international expansion of their markets. It highlighted the complexity of the internationalization process, requiring careful consideration of factors such as economic stability, logistics efficiency, and cultural compatibility. The paper proposed the use of the Analytic Hierarchy Process (AHP) as a systematic decision-making resource to prioritize these factors and ensure that target markets align with the producer's overall goals.
The study’s findings revealed that economic stability and GDP growth are highly influential criteria when assessing potential international markets for the Brazilian livestock producer involved. This indicates a strong emphasis on market resilience and potential for long-term growth prospects. Countries demonstrating favorable economic trends are likely to be perceived as more attractive for investment and trade expansion. While economic factors are the main reference, the study recognized the significance of cultural considerations in facilitating successful market entry. Countries like France and Belgium, with greater cultural similarities to Brazil, present potential advantages in terms of smoother business operations and reduced friction caused by cultural differences. This highlights the importance of considering the 'softer' aspects of international expansion for long-term market success.

The study concludes by advocating for a balanced approach to international market selection. While Turkey emerges as a promising market due to its economic strengths, it suggests exploring diversification across multiple countries. This diversification should weigh economic stability, logistics, and cultural fit to mitigate risks associated with dependency on a single market.

Finally, the study stresses the value of engaging stakeholders and conducting sensitivity analysis to tailor the findings to the specific strategic objectives of the producer. Thus, for future research, the modeling preferences stage could take into account group preferences or even machine learning approaches to incorporate a wider range of individual preferences of a very large set of Decision-Makers.

REFERENCES


EU. AGRI-FOOD TRADE STATISTICAL FACTSHEET European Union - Extra EU27 Notes to the reader: Extraction date: Geneve: [s.n.].


MARTINS, G. Diagnóstico sobre sistemas de dados agrícolas do Brasil para um sistema nacional de avaliação de danos e perdas por desastres na agricultura. [s.l.] FAO, 2021.


ROBECOSAM. Dow Jones Sustainability Diversified Indices Guide. Version 1.2. Zurich: [s.n.].


