Evaluation of Most Effective Third-Party E-Commerce Platform in Senegal

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Abstract: With the fast development of the new information and communication technologies and their current involvement in the business world, no country as less developed as it can be, can't ignore them. Developed and emerging countries have understood it and have very early exploited the opportunities offered by these information and communication technologies. One of their most compelling opportunities is the emergence of electronic commerce. However, the e-commerce is not limited to the purchase and sale of goods and services through the Internet, but it requires a strategic regulation for its proper functioning; because its development passes through its proper functioning. In the majority of the less developed countries, e-commerce is still at its embryonic stage where the large part of online transactions happens in social networks like Facebook and Whatsapp. Senegal is one of those countries, therefore the objective of this research to find a solution on how to organize the Senegalese e-commerce market by proposing the most effective third-party e-commerce platform that can be suitable to its market. There are different types of e-commerce but the most known, used and that have proved their effectiveness are the B2B e-commerce, B2C e-commerce, and C2C e-commerce. According to the Statistics Portal, Statista, the B2B e-commerce worldwide gross merchandise volume was 7,300 billion USD in 2016 and the B2C e-commerce worldwide sales reached 1,859 billion USD the same year. As for the C2C e-commerce, eMarketer estimated its worldwide sales at 1,915 billion USD in 2016. Therefore, they are the third-party e-commerce platforms used as the alternatives and from which the best for the Senegalese e-commerce market is evaluated in the research through the use of the analytical hierarchy process (AHP). The results have shown the B2B third-party e-commerce platform to be the most effective for the Senegalese market; without overlap of alternatives within uncertainties as of the result of the sensitivity analysis.

Keywords: Evaluation, Effective, Third-party e-commerce platform, Senegal

1. Introduction

In recent years, the development of e-commerce has been so fast that no company can any longer take the chances of ignoring the internet, even if it does not itself sell much or anything at all online. E-commerce is not only a trend but an economic buster if we refer to its global turnover in recent years. According to e-Marketer's recent report, "Worldwide retail e-commerce sales will reach 1.915 trillion USD this year". Which economy in the world would not want to benefit from the advantages of this innovative way of doing business? However, the diffusion of ICTs throughout the world has been extremely uneven with a large gap between developed countries, emerging countries, and less developed countries. Moreover, that unevenness is also noticed both within and between less developed countries. That is the reason why some less developed countries are likely to be excluded from international markets because of their lack of necessary capacities to take advantage of the ICTs' innovations, such as e-commerce.
Nevertheless, those noticed disparities are not a reason for less developed countries to stay out the e-commerce cycle and benefit from it. In fact, most of the emerging countries were not as economically stable as they are now when they were starting their e-commerce. However, they adopt it to the realities of their own countries to make it work and are still finding ways to improve it.

1.1 Problem Statement
Senegal is among the countries where trading is the principal economic activity. Trading is present at all economic levels, from the district sellers to the top businesses. In fact, most of the entrepreneurship businesses are related to trade.

With the accession of Smartphone's users, the new trend is to sell or/and buy online, but mostly through the social media like Facebook, or Whatsapp. The few third-party e-commerce platforms that exist are ignored by most of the population and the few people who use it sometimes struggle to complete their transactions whether it is because of the mode of payment or the pickup options, just to name these two.

1.2 Aim of the Study
Few articles are written on e-commerce in Africa and the ones that are available mostly study the problems related to e-commerce development in the continent. Very few bring solutions to those problems. Third-party e-commerce platforms are quasi-inexistent in the continent and when they do, they lack effectiveness on some points, or people are not that aware of it.

In Senegal, the online businesses usually take place via social media or on businesses' direct website. E-commerce is developing within the country, but because of its lack of organization, it cannot exceed the beginning stage.

Thus, this research is done with the aim of evaluating the most effective third-party e-commerce platform in Senegal as a solution and boosts the potential of e-commerce development in Senegal.

2. Literature Review
According to Tsalgatidou and Pitoura (2001), a third-party e-commerce platform provides users with an interface with the suppliers' products catalogs and may, also, support payment, logistics, or orders. They all have in common the fact that they at least provide a user interface for the suppliers' products catalogs. Several additional features such as the trademark, the payment, the logistics, the orders and finally the full scale of secured transactions are added to third-party platforms.

Moreover, Timmers and Gasos (2002), added that in third-party e-commerce platforms, a provider puts the catalogs of connected suppliers online, offering catalog search facilities, ordering, and secure payment platforms to buyers. It is a new model that is appropriate to the businesses wishing to let the handling of their Web marketing to a third-party. The third-party e-commerce platforms are intermediary virtual platforms designed by professionals in the field for online businesses and consumers.

According to Qu, Pavlou, and Davison (2014), the third-party e-commerce platforms have a focal role in the creation and the maintenance of the infrastructures to assist the sellers and the buyers with equity. The third-party e-commerce platforms provide to their customers the technological know-how needed to run online businesses and the necessary information management related to it.
Gefen and Pavlou (2012), referred the role to the management and the mediation of the named interconnections. In fact, the third party e-commerce platforms allow a more organized e-commerce environment.

The B2B, B2C and C2C third-party e-commerce platforms are different forms of electronic commerce, but each of them has proved to be a successful business model. The mode choice of the third-party e-commerce platform between sales agency and resale is relevant to the effect of sales in the electronic channel on demand in the traditional channel (Abhishek et al., 2015).

Table 1: The Difference of Process between B2B, B2C and C2C Platforms

| Third-party E-commerce Platform | Explanation                                                                 | Examples  |
|--------------------------------|-----------------------------------------------------------------------------|-----------|
| B2B                            | The platform serves as an agent connecting the businesses.                   | Alibaba   |
| B2C                            | The platform reserves the item first and then resells to the buyers.         | Amazon    |
| C2C                            | The platform serves as an agent connecting the buyers and sellers.           | Taobao   |

Jiang et al. (2011) used the "Mid Tail" theory to analyze the e-tailer's mode selection problem of a platform and suggested that the e-tailer might select different modes for different kinds of products. Moreover, according to Mantin et al. (2014), the e-tailer's bargaining power with the manufacturer can be increased after the building of the platform, and it benefits the consumers, but it will decrease the consumers' benefits if the power is too big.

As regards the third-party e-commerce platforms' pricing, most of the literature focuses on fixed costs, proportional expenses or two-part tariffs (Rochet and Tirole, 2006; Sen, 2005; Wang, 1998). Moreover, it is shown that the proportional fees offer more benefits to avoid the risk of moral hazard and to attract more participants in comparison with two-part tariffs (Muthers and Wismer, 2013). While Wang and Wright (2015), extended the area to the proportional fees with price discrimination.

In a nutshell, the third-party e-commerce platforms allow a more organized e-commerce environment; therefore the aim of this paper is to figure out which among them is more effective in the Senegalese market. It will be done through one of the most effective multiple-criteria decision-making (MCDM) tool known as the analytic hierarchy process (AHP).

3. Research Methodology
The data collection was done with a pairwise comparison questionnaire. Respondents of Senegalese nationality from a different professional industry and academic background have been selected based on their experience of the Senegalese market.
The collected data have been synthesized and analyzed with the AHP-OS online software. If the set of decision criteria is considered as \( C = \{C_j | j = 1, 2 \ldots n\} \), we can summarize the data of the \( n \) sub-criteria pairwise comparison in an \((n \times n)\) evaluation matrix \((A)\) in which every element \( a_{ij} (i, j = 1, 2 \ldots n) \) is the weights of the criteria's ratio. A square and reciprocal matrix can show the pairwise comparison. In this matrix \( a_{ij} = 1/a_{ji} \) for all respondents, \( n \times n \) matrices are:

\[
A = (a_{ij}) = \begin{bmatrix}
    a_{11} & a_{12} & K & a_{1n} \\
    a_{21} & a_{22} & K & a_{2n} \\
    M & M & M & M \\
    a_{n1} & a_{n2} & K & a_{nn}
\end{bmatrix}
\]

\[
G_{ij} = \prod_{x=1}^{10} ax_{ij}^{1/n} \forall i, j
\]

Here \( a_{12} \) represents \( a_{12} \) element of the first respondent matrix and so on. The following formula gives its synthesized matrix:

\[
a_{ij} = \left( \frac{a_{ij}}{\text{some of jth column}} \right) \ldots (2)
\]

Now, \( W = (w_1, w_2, w_3 \ldots w_n) \) is a weight of priority and are computed base on Satty’s eigenvector process.

\[
w_n = (\text{Sum of ith row/n}) \ldots (3)
\]

Satty (2000) showed the relation between evaluation matrix \( A \) and weight vector (Chen, 2006). The right eigenvector \((\omega)\) corresponding to the largest eigenvalue \((\lambda_{\text{max}})\) give the relative weights as shown in the following formula:

\[
A \omega = \lambda_{\text{max}} \omega \ldots (4)
\]
The matrix A has rank 1 and \( \lambda_{\text{max}} = n \) when there is consistency in the pairwise comparisons. There are many ways of validating the consistency, but here the eigenvalue method is used to check the consistency of results. The relation between the entries of A: \( a_{ij} \times a_{jk} = a_{ik} \) defines the consistency (Saaty, 2008; Kumar and Dash, 2014). According to Saaty (2008), the consistency index (CI) is calculated with the formula:

\[
\text{CI} = \left[ \frac{\lambda_{\text{max}} - n}{n-1} \right] \quad (5)
\]

Where \( \lambda_{\text{max}} \) represents the maximum variance of the matrix, the average of all \( \lambda \) is taken and assumed as the maximum variance possible; the consistency index (CI) and consistency ratio (CR) are calculated and check the consistency.

The consistency of the evaluations is known by the value of the consistency ratio (CR). The ratio of the consistency index (CI) and the random index (RI) is the value of the consistency ratio (CR), as indicates in Equation (6). The accepted upper limit for Consistency Ratio is the value 0.1 (Saaty, 1980; 2000; 2008). The evaluation process should be repeated in order to improve consistency when the consistency ratio is more than the given value.

\[
\text{CR} = \left[ \frac{\text{CI}}{\text{RI}} \right] \quad (6)
\]

All data used in our study were proved to be consistent; therefore all 168 questionnaires were used in the analysis.

4. Data Analysis and Interpretation

The data were analyzed using the AHP-OS online software, a web-based tool to support rational decision making based on the analytic hierarchy process (AHP). As a result of the output, we get the local and global weights of different criteria and sub-criteria but also of the criteria. The best alternative is distinctive, but a sensitivity analysis is done to see the robustness of the AHP result.

4.1 The Determination of the Relative Weights of the Decision Criteria

The decision hierarchy from Table 2 displays the hierarchy of objective, criteria, sub-criteria, and alternatives with their relative weights. And Figure 2 is an illustration of the sub-criteria global priorities.

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**Figure 2:** Consolidated Global Priorities
Table 2: Hierarchy with Consolidated Priorities

| Decision Hierarchy | Level 1 | Level 2 | GB Prior. | B2B E-commerce Platform | B2C E-commerce Platform | C2C E-commerce Platform |
|--------------------|--------|---------|-----------|------------------------|------------------------|------------------------|
| Effective Third Party E-commerce Platform in Senegal | E-commerce Technological Infrastructure 0.288 | Technology Know-How 0.411 | 11.0% | 0.361 | 0.414 | 0.225 |
| | | Access to Information 0.304 | 8.7% | 0.575 | 0.541 | 0.284 |
| | | Information Quality 0.285 | 8.2% | 0.407 | 0.567 | 0.226 |
| | E-commerce Operations 0.132 | Ease of Use 0.299 | 4.0% | 0.356 | 0.559 | 0.283 |
| | | E-payment Mode Variety 0.282 | 3.7% | 0.370 | 0.348 | 0.282 |
| | | Logistics Options 0.263 | 3.5% | 0.405 | 0.343 | 0.253 |
| | | Customization 0.157 | 2.1% | 0.413 | 0.329 | 0.257 |
| | E-commerce Security 0.414 | Information Security 0.305 | 12.6% | 0.384 | 0.328 | 0.288 |
| | | Privacy of Information 0.264 | 10.0% | 0.376 | 0.334 | 0.291 |
| | | Online Payment Security 0.431 | 17.8% | 0.463 | 0.348 | 0.249 |
| | E-commerce Revenue 0.166 | Network Sales Share 0.152 | 2.5% | 0.364 | 0.332 | 0.284 |
| | | Customer Satisfaction Degree 0.377 | 6.3% | 0.348 | 0.387 | 0.265 |
| | | Low Cost 0.152 | 2.5% | 0.353 | 0.327 | 0.321 |
| | | Decrease of Marketing Cost 0.114 | 1.9% | 0.387 | 0.314 | 0.299 |
| | | Improvement of Work Efficiency 0.205 | 3.4% | 0.433 | 0.347 | 0.221 |
| | | | 1.0 | 38.4% | 34.9% | 25.7% |

Table 3: Consolidated Decision Matrix of Nodes

| Effective Third Party E-commerce Platform in Senegal | 2.484957 | 0.673475 | 1.55762 |
|-----------------------------------------------------|----------|----------|---------|
| 0.402421 1                                         | 0.323399 | 0.899341 |
| 1.484836 3.092153 1                                 | 2.466586 |
| 0.642005 1.111925 0.405419 1                         |

E-commerce Technological Infrastructure

| 1 | 1.359482 | 1.437252 |
| 0.735574 1 | 1.06787 |
| 0.695772 0.936444 1 |

E-commerce Operations

| 1 | 1.081001 | 1.100878 | 1.923667 |
Table 4: Alternatives with Sub-criteria Local Weights

| Sub-Crit/Alt                  | B2B E-commerce Platform | B2C E-commerce Platform | C2C E-commerce Platform |
|-------------------------------|-------------------------|-------------------------|--------------------------|
| Technology Know-How           | 0.360938                | 0.413915                | 0.225147                 |
| Access to Information         | 0.374853                | 0.341251                | 0.283896                 |
| Information Quality           | 0.406965                | 0.367223                | 0.225813                 |
| Ease of Use                   | 0.357803                | 0.358987                | 0.28321                  |
| E-payment Mode Variety        | 0.369891                | 0.348256                | 0.281853                 |
| Logistics Options             | 0.404826                | 0.34252                 | 0.252653                 |
| Customization                 | 0.413428                | 0.329381                | 0.257191                 |
| Information Security          | 0.384492                | 0.327852                | 0.287656                 |
| Privacy of Information        | 0.374934                | 0.334027                | 0.291038                 |
| Online Payment Security       | 0.402963                | 0.347909                | 0.249128                 |
| Network Sales Share           | 0.383586                | 0.332317                | 0.284097                 |
| Customer Satisfaction Degree  | 0.347839                | 0.387383                | 0.264779                 |
| Low Cost                      | 0.35272                 | 0.326717                | 0.320563                 |
| Decrease of Marketing Cost    | 0.387434                | 0.313956                | 0.29861                  |
| Improvement of Work Efficiency| 0.432709                | 0.346668                | 0.220623                 |
| Group Result                  | 0.383651                | 0.34892                 | 0.267429                 |

With the results in Table 4, we calculate the alternatives with criteria local weights by summing the local weights their respective sub-criteria in excel (Table 5).
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**Table 5: Alternatives with Criteria Local Weights**

| Crit/Alt                        | B2B E-commerce Platform | B2C E-commerce Platform | C2C E-commerce Platform |
|---------------------------------|-------------------------|-------------------------|-------------------------|
| E-commerce Technological        | 1.142756                | 1.122389                | 0.734856                |
| Infrastructure                  |                         |                         |                         |
| E-commerce Operations           | 1.545948                | 1.379144                | 1.074907                |
| E-commerce Security             | 1.162389                | 1.009788                | 0.827822                |
| E-commerce Revenue              | 1.904288                | 1.707041                | 1.388672                |

In the analysis, the criteria "e-commerce security" comes first with a global weight of 41.4%, followed by "e-commerce technological infrastructure" 28.8%, "e-commerce revenue" 16.6% and finally "e-commerce operations" come in the last position with 13.2%.

The sub-criteria of the criteria "e-commerce security" and "online payment security" (17.8%) are the priority, followed by "information security" (12.6%) of the same criteria. It highlights the fact that the respondents are very concerned about "e-commerce security" provided by third-party e-commerce platforms which are related to information security, the privacy of information and the online payment security. The analysis critically shows that when using third-party e-commerce platforms, the majority of respondents are much concerned about online payment security.

The criteria "e-commerce technological infrastructure" is the second most valued criteria among the remaining three with a weight of 28.8%. E-commerce technological infrastructure is an infrastructure that supports businesses, customers and operations. It includes specifications for information management, systems management, and task management like technology know-how, access to information and information quality. The sub-criterion "technology know-how" is the priority (11.8%) followed by "access to information" with 8.7%, then "information quality" with 8.2%. It shows that the respondents are more concerned about the technology used by third-party e-commerce platform before checking anything related to the information in it.

With 16.6% of global weight, the criteria "e-commerce revenue" is in the third position of priority. All users of any e-commerce platform gain something from it. Using a third-party platform a seller sells his goods through an intermediary website free or with a charge without worrying about its maintenance or even marketing. As for buyers, the first benefit is to shop wherever they are with the added value that goods are cheaper online. Therefore, the sub-criteria "customer satisfaction degree" holds the bigger priority under this criteria (6.3%), followed by "improvement of work (3.4%)", "network sales share" and "low cost" (2.5%), "decrease of marketing cost" (1.9%) respectively in that order.

"E-commerce operations" is the least important criteria among others according to data gathered from respondents with 13.2% weight. The sub-criteria "ease of use" (4.0%) is one of the most influencing followed by "e-payment mode variety" with 3.7%, then "logistics options" (3.5%) and "customization" (2.1%). It shows that when it comes to e-commerce operations, the criteria "ease of use" is non-negligible. When wanting to use a third-party e-commerce platform, sellers or buyers need to feel comfortable in it. If they feel lost in it, there are big chances that they will not use it, or they will only use it when they do not have other options. Table 6 shows the global weights by nodes and Table 7 the global priority by sub-criteria.
### Table 6: Global Weights by Nodes

| Node | Effective Third Party E-commerce Platform in Senegal |
|------|------------------------------------------------------|
| Weights | E-commerce Technological Infrastructure | E-commerce Operations | E-commerce Security | E-commerce Revenue | CR |
| Group result | 0.287719 | 0.132465 | 0.413844 | 0.165972 | 0.004135 |
| (-) | 0.006582 | 0.003506 | 0.007204 | 0.004289 | |
| (+) | 0.006449 | 0.003576 | 0.007272 | 0.004365 | |

| Node | E-commerce Technological Infrastructure |
|------|------------------------------------------|
| Weights | Technology Know-How | Access to Information | Information Quality | CR |
| Group result | 0.411271 | 0.303534 | 0.285195 | 0.000012 |
| (-) | 0.006535 | 0.005968 | 0.005698 | |
| (+) | 0.006547 | 0.006019 | 0.005751 | |

| Node | E-commerce Operations |
|------|------------------------|
| Weights | Ease of Use | E-payment Mode Variety | Logistics Options | Customization | CR |
| Group result | 0.298505 | 0.281876 | 0.262825 | 0.156794 | 0.000187 |
| (-) | 0.00607 | 0.005907 | 0.005604 | 0.003602 | |
| (+) | 0.00612 | 0.005961 | 0.005699 | 0.003655 | |

| Node | E-commerce Security |
|------|----------------------|
| Weights | Information Security | Privacy of Information | Online Payment Security | CR |
| Group result | 0.304984 | 0.264164 | 0.430853 | 0.000009 |
| (-) | 0.006094 | 0.005465 | 0.00671 | |
| (+) | 0.006147 | 0.005523 | 0.006716 | |

| Node | E-commerce Revenue |
|------|---------------------|
| Weights | Network Sales Share | Customer Satisfaction Degree | Low Cost | Decrease of Marketing Cost | Improvement of Work Efficiency | CR |
| Group result | 0.151621 | 0.377169 | 0.151678 | 0.114144 | 0.205388 | 0.002726 |
| (-) | 0.003854 | 0.006782 | 0.003779 | 0.003098 | 0.004864 | |
| (+) | 0.004054 | 0.006604 | 0.004028 | 0.003055 | 0.00518 | |
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Table 7: Global Priority by Sub-criteria

| Node | pTotal |
|------|--------|
| Technology Know-How | 0.11833 |
| Access to Information | 0.087312 |
| Information Quality | 0.082056 |
| Ease of Use | 0.039541 |
| E-payment Mode Variety | 0.037339 |
| Logistics Options | 0.034815 |
| Customization | 0.02077 |
| Information Security | 0.126216 |
| (+) | 0.004578 |
| (-) | 0.003728 |
| CR | 0.001941 |
| CR | 0.001819 |
| CR | 0.001715 |
| CR | 0.001058 |
| CR | 0.000877 |

4.2 The Determination of the Relative Rankings of the Alternatives

From the AHP analysis output illustrated by Figure 3, it appears that B2B third-party e-commerce platform is the best of the proposed alternatives (38.4% for b2b e-commerce platform, 34.9% for B2C e-commerce platform and 26.7% for C2C e-commerce platform. Nevertheless, the robustness of that assumption is analyzed with the sensitivity analysis.

Figure 3: Consolidated Weights of Alternatives
4.3 The Robustness Analysis (Sensitivity Analysis, WM)

4.3.1 Weight Uncertainties

The results on Table 8 show that there is no overlap of alternatives within uncertainties.

| A1 | Technology Know-How | Access to Information | Information Quality | Ease of Use | E-payment Mode | Logistics Options | Customization | Information Security |
|----|---------------------|-----------------------|--------------------|------------|----------------|-------------------|---------------|----------------------|
|    | 0.275149            | -                     | 0.317622           | 0.243804   | 0.202003       | -                 | 0.197562      |                      |

4.3.2 Robustness

The solution for the top alternative B2B E-commerce Platform is robust. The percent-any critical performance measure is for alternative B2B E-commerce Platform under criterion Online Payment Security. A change from 41.3% by absolute -23.6% will change the ranking between B2B E-commerce Platform and B2C E-commerce Platform. Nevertheless, further analysis will be done with TOPSIS to confirm or reject the AHP sensitivity analysis.

5. Conclusion and Recommendations

The research results have shown that for that third-party e-commerce platform to be effective in the Senegalese environment, the best alternative is a B2B e-commerce platform. It means that the businesses that can benefit the most from it are the Senegalese small and medium enterprises (SMEs).

In the e-commerce world, using the latest online business technology, the right means of advertisements are crucial to the success of any business that wishes to go online. Therefore, the small and medium enterprises can envisage using the services of a third-party e-commerce platform to expand their markets. The services offered by B2B third-party e-commerce platforms exempt them from having to set up their online platform and taking care of its management. All the process related to the transactions is taken care of by the third-party e-commerce platform. Those services are of course not free, but the benefits of paying for the use such platforms’ services are far greater for them than setting up their platform...
because the costs of setting up an e-commerce platform with the needed technology, security and competence are very high.

The great promise of these B2B third-party e-commerce platforms to businesses is that it shortens the long process of negotiations and transactions between them. Thus it results in the improvement of their work efficiency. It also creates price competitiveness because many businesses gathered in a single marketplace where prices can be compared. More importantly, it allows them to reach new markets. Such benefits can't be ignored by SMEs.

On the other hand, with our sensitivity analysis, findings have also shown that a change from 41.3% by absolute -23.6% will change the ranking between B2B e-commerce platform and B2C e-commerce platform. It means that B2C third-party e-commerce platform also has chances to be effective in Senegal. It is understandable because more and more Senegalese consumers are now interested in shopping online. But due to the lack of trust problem they have towards e-commerce websites, the option B2C option is safer than the C2C option. Because in B2C third-party e-commerce platforms professional businesses sell their products to the end customers while a C2C third-party e-commerce platform is a space where consumers sell their goods to other consumers.

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