

URBAN BIG DATA ANALYTICS: SUSTAINABLE BUSINESS PRACTICES, GREEN TECHNOLOGICAL INNOVATION, AND FIRM COMPETITIVENESS

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ABSTRACT

Despite the importance of corporate environmental integration, only limited research has been carried out on this topic. Using and replicating data from European Commission, we performed analyses and made estimates concerning sustainable business practices, green technological innovation, and firm competitiveness in relation to urban big data analytics. The outcomes of a study based on data gathered from 4,600 respondents provide support for our research model. Descriptive statistics of gathered data from the finalized surveys were established when relevant.

KEYWORDS: *urban; big data analytics; sustainability; technological innovation; firm competitiveness.*

1. INTRODUCTION

Competitive advantage represents a strategic, lasting goal. Corporate environmental integration in addition to stakeholders' constraints are instrumental in moving toward a green marketing strategy that has a mediating impact on financial performance as a result of competitive advantage (Papadas et al., 2019). To attain sustainability, organizations should establish a consonance in economic, social, and environmental operations (Bekken, 2019; Costea, 2020; Miller, 2020; Popescu Ljungholm and Olah, 2020; Taylor, 2020) and be effective in their undertakings. Environmental routines can thoroughly influence corporate sustainability performance by cutting down energy use and material consumption, enhancing stakeholder involvement, decreasing expenses, and boosting product quality. Investments in environmental routines increase the expense burden of the organizations and adversely impact their economic performance (Çankaya and Sezen, 2019).

2. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The sustainable competitive advantage is improved from the implementation of an integrated green marketing approach. Strategic enviropreneurial proposals are evidence of social commitment and a determination to configure marketing operations in line with the requirements of present and future stakeholders. If companies are strategically environment-friendly, competitive advantage and sustained superior financial performance (Bourke et al., 2019; Ionescu, 2019; Mircica, 2020; Porter, 2020; Tisdell et al., 2020) will be attained. Organizations that are in favor of sustainability should make substantial alterations in their strategic marketing routines (Brown et al., 2020; Ionescu, 2020; Pera, 2019; Scott et al., 2020; Turnbull et al., 2020) so as to have as an objective a green marketing approach and thus reach business standards and performance ascendancy (Papadas et al., 2019). Green marketing provides relevant prospects for organizations that aim to relocate themselves and

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link with significant components of the society, particularly focusing on customers. While some organizations only green their advertisements, other companies that are actually cognizant of the environment, and accordingly allocate further expenses, cannot accomplish the intended outcomes by inadequately expressing themselves to end users (Çankaya and Sezen, 2019).

Managers should strengthen and influence green culture to organize and drive employee energy to attain environmental innovation, that is, disseminating low-carbon culture value across the company. Managers should shape innovation by furthering the values of decreasing environmental deterioration harnessed to generate sound green breakthrough. For the purpose of effectively innovate and upgrade environmental advancement, managers should satisfy particular demands in relation to their collective values. Environmental innovation can be integrated into organizational green culture (Clarke, 2020; Klietk et al., 2020; Popescu et al., 2020; Smith, 2020; Zhuravleva et al., 2020) that managers are frequently asked to put into operation. Organizational green culture can (in)directly shape competitive advantage via environmental innovation. Unless the latter is developed on organizational green culture, the outcome of any organizational culture on a company's ecological performance will be indeterminate (Wang, 2019).

The involvement of private organizations is key for effective adoption of circular bioeconomy strategies, mainly by use of a competitiveness logic. Circular bioeconomy will improve organizational competitiveness by detecting of new markets, advancing more sustainable goods and operations, and setting up innovative business patterns. Firm participation in environmental approaches may result in enhanced competitiveness (DeBoer et al., 2020).

3. METHODOLOGY AND EMPIRICAL ANALYSIS

Using and replicating data from European Commission, we performed analyses and made estimates concerning sustainable business practices, green technological innovation, and firm competitiveness in relation to urban big data analytics. The outcomes of a study based on data gathered from 4,600 respondents provide support for our research model. Descriptive statistics of gathered data from the finalized surveys were established when relevant.

4. RESULTS AND DISCUSSION

For managers, the beneficial impact on competitiveness and profit indicates the effectiveness of undertaking perpetual investment in green marketing projects, and the ensuing particular positioning. To boost subsequent enhanced performance, managers should harness stakeholders' constraints for green marketing concern and superiority (Papadas et al., 2019). Green consumer behavior will significantly decrease the environmental effect of the purchased goods (Çankaya and Sezen, 2019). Using innovative production entrepreneurial approaches, organizations are aware of environmental features as competitive advantages (Sdrolia and Zarotiadis, 2019). (Table 1)

Table 1. Clarify whether you agree or not with these assertions as regards the environment and ecological products. (%)

	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know
Purchasing ecological products can impact the environment significantly	47	42	5	3	3

Ecological products are as beneficial as regular ones	30	51	10	5	4
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Sources: European Commission; our survey among 4,600 individuals conducted May 2020.

Innovative green approaches tend to shape, while data management to a limited extent acts upon, competitiveness (Sellitto and Fehlberg Hermann, 2019). Proactive corporate approaches and tangible determination in delivering green performance is a business prospect for growth (Lam and Li, 2019). The harmonized advancement of the environment, society, and the economy represents a relevant matter for consolidating regional green competitiveness (Cheng et al., 2019). Multidimensional existing large-scale downturn comprises socioeconomic imbalances and environmental deterioration, thus necessitating a swift reassessment of a cutting-edge production approach that furthers competitive advantages in congruence with sustainability (Sdrolia and Zarotiadis, 2019). (Table 2)

Table 2. Clarify whether you agree or not with these assertions as regards the environment and ecological products. (%)

	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know
Ecological products are conveniently available in shops	20	40	32	6	2
It is unproblematic to distinguish ecological products from other goods	22	35	31	9	3

Sources: European Commission; our survey among 4,600 individuals conducted May 2020.

Green supply chain management practices positively exert influence on the environmental, economic, and social performance of organizations. Companies that embrace and carry out a greenly sensitive production strategy can advance superior connections with the society. Through green production operations, elimination of noxious chemicals from the manufacturing process will disallow employees from being at the mercy of contaminants and hazardous substances (Çankaya and Sezen, 2019). (Table 3)

Table 3. How much more would you like to spend for goods if you were unequivocal that they were more ecological? (%)

You would not like to spend more	16
You would like to spend 5% more	50
You would like to spend 6%–10% more	22
You would like to spend 11%–20% more	8
You would like to spend more than 20%	4

Sources: European Commission; our survey among 4,600 individuals conducted May 2020.

Green innovation necessitates that employees advance environmental protection knowledge and disseminate it within the company, entailing the refashioning of current data. Competitive advantage

is an outcome of organizational green culture, which leads to environmental innovation, and is distributed throughout the company. Organizational green culture fashions environmental innovation that shapes ecological performance and competitive advantage. An organizational green culture reinforcing green values drives managers to be familiar with resources employed, waste generated, and energy consumed, consequently enhancing companies' environmental performance (Wang, 2019). (Table 4)

Table 4. Have you performed, throughout the past month, any of the following activities for environmental grounds? (% , Yes)

Separated nearly all of the collected waste for recycling	82
Reduced the energy consumption	48
Decreased the water use	45
Cut down the use of disposable goods	32
Chosen locally cultivated items or groceries	28
Selected a more low-carbon way of traveling	24
Purchased green products marked with an ecological label	24
Driven your car not so much without substituting it by a different means of transport	21

Sources: European Commission; our survey among 4,600 individuals conducted May 2020.

Organizational green culture can boost competitive advantage. From a practical perspective, managers should advance a culture reinforcing environmental values, as organizational green culture can demarcate among competitors. Current green protection pressure cannot be effortlessly manipulated, but managers should be thoroughly familiar with their company's ecological approach when environmental issues appear so as to make pertinent decisions that associated with competitive advantage are determined by their organization's plan to participate in low-carbon culture undertakings (Wang, 2019). (Table 5)

Table 5. Should companies be required to publish reports as regards their environmental performance and the one of their products? (%)

Yes, for both firms and items	67
Yes, but only for firms	11
Yes, but only for items	15
No, it should be carried out optionally	7

Sources: European Commission; our survey among 4,600 individuals conducted May 2020.

Green performance mediates to a certain degree the link between environmental routines and competitiveness. Mediating consequences materialize between competitiveness and environmental conventional routines, organizational procedures, and stakeholders' assimilation (Salem, 2019). Organizations can pioneer through green product innovation that enables them to be dissimilar and consequently obtain competitive advantage. Environmental burden of goods throughout their complete life cycle is incontestable (Sdrolia and Zarotiadis, 2019). (Table 6)

Table 6. How much do you have confidence in producers' claims as regards the environmental performance of their goods? (%)

Complete confidence	14
Likely to trust	22
Unlikely to trust	36
Do not have confidence in them at all	28

Sources: European Commission; our survey among 4,600 individuals conducted May 2020.

5. CONCLUSIONS AND IMPLICATIONS

The encompassing objective of any green marketing initiative is to cut down the company's environmental impact. Cutting-edge strategies and dedicated employees are decisive when persevering in an environmentally-oriented competitive advantage. Internal green marketing operations may increase the effect of the main green marketing approach on competitive advantage (Papadas et al., 2019). Green environmental procedures and swiftly unstable technological settings may constitute an important challenge. Turning green culture into a primary issue means, among others, employing managers who bolster environmental matters that constitute collective values of ecological cultures organizations aim to espouse. Considering present rigorous environmental procedures and environmental approaches, managers should carry out a low-carbon behavior to bring about new market prospects for their organizations, whose green performance is consequently enhanced (Wang, 2019).

Survey method

The interviews were carried out online and gathered data were weighted by age, race/ethnicity, gender, education, and geographic region, employing the Census Bureau's American Community Survey to precisely display the demographic composition of the United States. The effect of weighting is enabled by sampling errors and test of statistical significance. We leveraged stratified sampling methods and weights were moderated not to go above 3. At the 95% confidence level, average margins of error are +/-2%. Percentage points are rounded to the nearest whole number for tabulation purposes. We evaluated the precision of the online polls by adopting a Bayesian credibility interval, and used confirmatory factor analysis to evaluate the accuracy and of measurement tools and an Internet-based survey software program for the delivery and gathering of responses.

Data and materials availability

All presented research has been published and displayed data is available from the specified sources.

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