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Leadership's Impact on E-commerce Growth and Crisis Management in Post-Lignite Urban Transitions

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Abstract:

In today's dynamic business environment, traditional management grapples with challenges posed by global factors such as competition, shifting consumer preferences, and political shifts. Increasingly, businesses are leveraging e-commerce for growth and adept crisis management (Strauss and Frost, 2012). Crisis management blends entities' technical expertise to manage emerging threats with political nuances, necessitating rapid identification and response in ambiguous situations, all while maintaining clarity (Boin, 2008). This study delves into the significance of leadership in e-commerce adoption and crisis navigation, spotlighting the transition of Western Macedonia from a coal-centric economy. Emphasis is placed on leadership's pivotal role in navigating these intricate dynamics.

Keywords: E-Commerce Growth, Leadership in Transition, Western Macedonia Transition, Crisis Management.

Περίληψη:

Στο σημερινό δυναμικό επιχειρηματικό περιβάλλον, η παραδοσιακή διοίκηση αντιμετωπίζει προκλήσεις από παγκόσμιους παράγοντες όπως ο έντονος ανταγωνισμός, οι μεταβαλλόμενες προτιμήσεις των καταναλωτών και οι πολιτικές αλλαγές. Το ηλεκτρονικό εμπόριο έχει καταστεί ένα κεντρικό εργαλείο για ανάπτυξη και αποτελεσματική διαχείριση κρίσεων (Strauss and Frost, 2012). Αυτός ο συνδυασμός τεχνικής εμπειρογνωμοσύνης και πολιτικής ευαισθησίας απαιτεί γρήγορη αναγνώριση και ανταπόκριση σε αμφίσημες καταστάσεις, διατηρώντας την σαφήνεια (Boin, 2008). Η παρούσα μελέτη εξετάζει το ρόλο της ηγεσίας στην υιοθέτηση του ηλεκτρονικού εμπορίου και τη διαχείριση κρίσεων, επικεντρώνοντας στη μετάβαση της Δυτικής Μακεδονίας από μια οικονομία βασισμένη στον άνθρακα. Η έμφαση δίνεται στην κρίσιμη συνεισφορά της ηγεσίας στη διαχείριση αυτών των περίπλοκων δυναμικών.

Λέξεις κλειδιά: Ηλεκτρονικό Εμπόριο, Διαχείριση Κρίσεων, Μετάβαση Δυτικής Μακεδονίας, Δυναμικό Επιχειρηματικό Περιβάλλον.

1. Introduction

In today's rapidly changing business environment, the shift towards e-commerce, driven by advancements in technology and an increased reliance on the internet, requires a fundamental reevaluation of traditional management strategies. This shift is essential as consumer purchasing behaviors change significantly, necessitating that businesses adapt to e-commerce to effectively address the complexities of the current market landscape (Valdez et al., 2021). In this context, Western Macedonia faces the urgent need to move away from its coal-dependent economy. The region's future prosperity is contingent on adopting modern business practices, with a particular focus on e-commerce, to ensure economic resilience and growth. The paper delves into the pivotal role of leadership in the adoption of e-commerce and effective crisis management, particularly within the context of Western Macedonia's economic shift away from coal dependency. The significance of this study lies in its exploration of a

relatively under-researched area: the impact of leadership on e-commerce development in specific regional contexts, such as Western Macedonia, during periods of economic transition. By focusing on this case, the research seeks to illuminate how tailored leadership strategies and digital adaptation efforts can contribute to e-commerce growth and guide regions through economic transformations. A central theme of the study is the identification of a gap in existing literature, which has extensively covered technology adoption models like TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology), yet often overlooks the influence of leadership within specific regional contexts on e-commerce expansion. This paper aims to fill this void by showcasing how leadership in Western Macedonia has facilitated the region's move towards e-commerce, highlighting the potential for sustainable economic growth through digital transformation. The research underscores the importance of leadership qualities such as vision and empowerment in fostering e-commerce success and enhancing operational efficiency during the transition from a lignite-dependent economy. It presents an argument for the critical role of leadership in navigating economic shifts, leveraging e-commerce for sustainable development, and implementing effective crisis management strategies. By examining the interplay between leadership, e-commerce adoption, and crisis management, the study offers new insights into how leadership can drive digital transformation in transitional economies, thereby contributing to a broader understanding of the dynamics at play in similar contexts. Understanding the role of leadership in guiding this adaptation is crucial, especially in regions undergoing significant economic transitions like Western Macedonia. The Context of Western Macedonia Western Macedonia, transitioning from a historically coal-dependent economy to embracing a digital economy, faces challenges and opportunities. The decline of the coal industry, driven by environmental sustainability goals and a global shift toward renewable energy, has resulted in economic and social challenges, including job losses and decreased revenue (Köhler et al., 2019; Lypiridi, 2021). This makes Western Macedonia an exemplary case for exploring how leadership influences e-commerce growth amidst economic transitions, providing insights for similar regions navigating towards a digital economy.

1.1.Methodology

This study aims to investigate the influence of effective leadership on e-commerce adoption and growth in transitioning economies like Western Macedonia. Employing a mixed-methods approach, we combine quantitative analysis of e-commerce performance metrics with qualitative interviews involving business leaders and stakeholders. This dual approach seeks to bridge existing research gaps by establishing correlations between leadership strategies and tangible outcomes in both e-commerce growth and crisis management amid the transition from reliance on lignite. We use a mixed-methods approach, starting with a quantitative survey of diverse local businesses and stakeholders. This survey employs a Likert scale questionnaire to measure e-commerce metrics like online sales growth and customer satisfaction. 100 participants provided insights, resulting in 71 usable responses. Following this, semi-structured interviews with 34 key informants, including business leaders and policymakers, delve deeper into the role of leadership in digital transitions and crisis management. By combining statistical analysis with thematic investigation, we gain a nuanced understanding of leadership's influence on e-commerce development. While findings from Western Macedonia are valuable, further exploration in other transitional economies is encouraged for validation.

2. Literature Review

Effective leadership emerges as a cornerstone in the realm of digital transformation, particularly in steering the successful adoption of e-commerce and managing crises. This essential leadership extends beyond mere guidance; it encapsulates a strategic alignment with transformative practices that catalyze organizational evolution and digital integration. Transformational leadership, a concept pioneered by Bass (1985), plays a pivotal role in this dynamic. It not only guides organizations through the intricacies of digital transformation but also boosts motivation and engagement towards technological advancements. This leadership style is further complemented by the insights from the Technology Acceptance Model (TAM), introduced by Davis (1989) and expanded upon by Venkatesh et al. (2003), which elucidates the critical factors influencing technology adoption, including perceived ease of use and usefulness. Adding depth to the understanding of transformational leadership's impact, the Transformational Leadership Questionnaire (Local Government Version) (TLQ-LGV) by Alimo-Metcalfe and Alban-Metcalfe (1999) provides a specialized tool for assessing leadership qualities essential for navigating the challenges of e-commerce adoption within urban transformations. Highlighting values such as integrity, empowerment, inclusiveness, and a genuine concern for others, the TLQ-LGV underscores the transformative power of leadership in fostering organizational resilience and adaptability during times of change. In the specific context of Western Macedonia's journey towards e-commerce as a mechanism for economic revitalization, the examination of varied leadership styles becomes indispensable. While transactional leadership focuses on operational efficiency, essential for the seamless operations of e-commerce, it is transformational leadership that truly propels innovation and facilitates adaptation to change—qualities crucial for thriving in today's digital marketplace. Moreover, adaptive leadership brings the agility and strategic foresight required to maneuver through economic fluctuations and crises. The spectrum of leadership styles significantly influences the adoption of e-commerce and the management of crises within organizations. The research accentuates the importance of diverse leadership approaches in enabling organizational change. From transactional leadership, which ensures operational efficiency through well-defined roles and structured tasks, to transformational leadership that champions technological advancements and fosters a culture of innovation and change. Adaptive leadership is highlighted as essential during crisis periods, providing the necessary resilience, agility, and strategic foresight. Furthermore, servant leadership emphasizes team prioritization and collaboration, significantly boosting team satisfaction and customer service quality—fundamental elements for online business success. Complementing these styles, digital leadership focuses on mastering the digital era through strategic use of online marketplaces and digital marketing, enhancing digital platform utilization and e-commerce performance. Integrating various models of technology acceptance, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), elucidates the influence of social factors and facilitation conditions on technology adoption. Similarly, the E-Commerce Success Model, derived from the DeLone and McLean IS Success Model, provides a framework for assessing e-commerce success via system quality, information quality, and user satisfaction metrics, emphasizing the vital need for high-quality digital services. These comprehensive insights not only reinforce the critical role of effective leadership in

navigating digital transformations and e-commerce adoption but also highlight the strategic and adaptable nature of leadership as essential in ensuring organizational resilience and success in the modern, fast-paced business landscape characterized by the extensive uptake of e-commerce. (Huria, 2019) Understanding the multifaceted nature of resistance to change is also paramount. Drawing upon the insights of Lawrence (1954), Maurer (1996), and others, it's clear that resistance often underpins the failure of change initiatives, introducing unforeseen costs and delays (Ansoff, 1990; Lorenzo, 2000). However, this resistance also presents a unique source of information, offering valuable insights into refining the change process (Beer & Eisenstat, 1996; Goldstein, 1988). The distinction between evolutionary and strategic changes (Blumenthal & Haspeslagh, 1994; Goodstein & Burke, 1991) provides a framework for leaders in post-lignite regions to approach e-commerce adoption and crisis management. Leadership plays a critical role in navigating the organizational change required for e-commerce growth, particularly in adapting to or improving performance within these transitioning economies (Barr et al., 1992; Boeker, 1997). Empirical research, reveals that resistance varies according to the type of change implemented. This highlights the importance of leadership in identifying and addressing sources of resistance tailored to the specific change initiative at hand. Whether dealing with distorted perceptions, low motivation for change, or a lack of creative response (Rumelt, 1995; Waddell & Sohal, 1998), leaders must effectively manage these challenges to harness the full potential of e-commerce in revitalizing post-lignite economies.

2.1. The Unique Context of Western Macedonia

The economic transition of Western Macedonia from a reliance on lignite presents distinct challenges and opportunities (Lypiridi, 2021; Köhler et al., 2019). Leadership plays a critical role in this transition, essential for the successful adoption of e-commerce and for building resilience in the face of economic downturns. As the coal industry declines, it becomes increasingly important for leaders to guide the region's economic transformation, emphasizing the need for strategic decision-making in determining Western Macedonia's future. This situation underscores the relationship between leadership effectiveness and the region's ability to adapt and thrive in a changing economic landscape. Effective leadership is crucial for addressing the negative effects of industrial transitions, including job losses and economic downturns. Leaders who are proactive play a key role in moving the workforce towards the digital economy, ensuring a smooth transition (European Commission, 2017). Such leadership is also essential in initiating e-commerce projects to boost the economy and in advocating for sustainable energy solutions to address the high energy demands of e-commerce operations (Gillingham & Stock, 2018). In times of market volatility, the role of visionary leadership becomes critical in making e-commerce a stabilizing factor, reducing the unpredictability of traditional markets (Yang & Blyth, 2007). The conceptualization of leadership as a social influence process, as emphasized by Parry (1998) and supported by notable scholars like Avolio (1995), Bass (1990), and Conger (1998), underpins the necessity of a nuanced approach in investigating leadership dynamics within e-commerce growth and crisis management contexts. These authors collectively advocate for the integration of qualitative and quantitative methodologies to capture the multifaceted nature of leadership, suggesting that such a mixed-methods approach facilitates a deeper understanding of the contextual variables and social

interactions that define effective leadership in transitional economies. This perspective, highlighting the complementarity rather than competition between diverse research methods, enriches the analysis of leadership's impact on organizational resilience and adaptability, offering a comprehensive framework for examining the transformative potential of leadership in steering post-lignite urban transitions towards sustainable e-commerce development. This study examines how leadership is managing Western Macedonia's shift away from coal, focusing on the effects of this transition on e-commerce adoption and crisis management. We aim to underscore the critical role of leadership in establishing a foundation for economic resilience and growth in areas undergoing digital transformation. Asserting that leadership, with its strategic foresight, adaptability, and commitment to sustainability, is vital for successfully managing socio-economic changes brought about by digitalization. Our analysis seeks to contribute to discussions on how leadership can drive economic recovery and sustainable development in regions moving beyond their industrial pasts.

2.2. Challenges for Western Macedonia's Local Businesses

Western Macedonia's shift away from lignite production presents significant challenges for its local businesses. Leadership plays a critical role in this transition, essential for the successful adoption of e-commerce and for building resilience in the face of economic downturns. As the coal industry declines, it becomes increasingly important for leaders to guide the region's economic transformation, emphasizing the need for strategic decision-making in determining Western Macedonia's future. This situation underscores the relationship between leadership effectiveness and the region's ability to adapt and thrive in a changing economic landscape.

Contemporary Business Landscape In today's fast-paced business world, the rise and extensive uptake of e-commerce have fundamentally reshaped traditional commerce models. As businesses navigate this evolving landscape, digital platforms have become indispensable for driving business innovation and expansion (Huria, 2019).

Economic Transition Challenges for Western Macedonia's Local Businesses: Western Macedonia's shift away from lignite production presents significant challenges for its local businesses. This transition has resulted in job losses, decreased revenue, and economic pressure, forcing small businesses to look for new growth strategies. A major obstacle in this transition is the lack of appropriate digital infrastructure; many areas do not have reliable internet access, which is critical for adopting e-commerce. This lack of connectivity limits small businesses from reaching new customers and fully utilizing online platforms. Financial limitations and a lack of digital literacy among small business owners and employees also pose significant barriers. The initial costs of entering e-commerce, such as creating online platforms and marketing digitally, are substantial for businesses with limited budgets (Euro-Commerce, n.d.; Valdez & Castillo-Vergara, 2020). Overcoming these financial and digital skill gaps is essential for small businesses to effectively engage in e-commerce (Dwivedi et al., 2021). Trust and security issues further impact the adoption of e-commerce in the region. Establishing consumer trust through secure online transactions is critical for the growth of e-commerce (Hyun Shik Yoon & Luis G. Occeña, 2015; Grabner-Kräuter, 2004). Small businesses need to implement strong security measures and ensure their websites are secure, high-quality, and customer-friendly to improve online sales (Kim et al., 2009; Saoula et al., 2023). In essence, the economic transition in Western Macedonia requires local businesses to overcome several hurdles, including the digital divide,

financial constraints, digital literacy deficiencies, and security concerns, to successfully adopt e-commerce and navigate the changing economic environment.

2.3. Economic Transition Challenges for Western Macedonia's Local Businesses

Western Macedonia's shift away from lignite production presents significant challenges for its local businesses. This transition has resulted in job losses, decreased revenue, and economic pressure, forcing small businesses to look for new growth strategies. A major obstacle in this transition is the lack of appropriate digital infrastructure; many areas do not have reliable internet access, which is critical for adopting e-commerce. This lack of connectivity limits small businesses from reaching new customers and fully utilizing online platforms. Financial limitations and a lack of digital literacy among small business owners and employees also pose significant barriers. The initial costs of entering e-commerce, such as creating online platforms and marketing digitally, are substantial for businesses with limited budgets (Euro-Commerce, n.d.; Valdez & Castillo-Vergara, 2020). Overcoming these financial and digital skill gaps is essential for small businesses to effectively engage in e-commerce (Dwivedi et al., 2021). Trust and security issues further impact the adoption of e-commerce in the region. Establishing consumer trust through secure online transactions is critical for the growth of e-commerce (Hyun Shik Yoon & Luis G. Occeña, 2015; Grabner-Kräuter, 2004). Small businesses need to implement strong security measures and ensure their websites are secure, high-quality, and customer-friendly to improve online sales (Kim et al., 2009; Saoula et al., 2023). In essence, the economic transition in Western Macedonia requires local businesses to overcome several hurdles, including the digital divide, financial constraints, digital literacy deficiencies, and security concerns, to successfully adopt e-commerce and navigate the changing economic environment. The global landscape offers insightful precedents that illuminate the path for Western Macedonia. Rwanda's e-commerce growth, driven by government leadership and strategic partnerships with the private sector, exemplifies the impact of a comprehensive digital strategy. This strategy, part of a broader digital economy agenda, has focused on creating an enabling environment through regulatory frameworks, digital skills development, and infrastructure improvements. Similarly, Estonia's success in e-commerce and digital transformation, supported by advanced digital literacy and infrastructure, provides a blueprint for leveraging digitalization to achieve economic growth and improved living standards.

2.4. Global Transitions

Drawing parallels to Western Macedonia, these case studies underscore the critical role of visionary leadership and strategic planning in navigating economic transitions. The leadership in Western Macedonia can draw inspiration from Rwanda's "whole-of-government" approach to digitalization and Estonia's investment in e-governance and digital services. By adopting similar strategies that emphasize regulatory support, digital skills enhancement, and infrastructure development, Western Macedonia can pave the way for its digital economy, leveraging e-commerce as a catalyst for economic revitalization and resilience in the face of global shifts.

Rwanda's E-commerce Growth: Rwanda has made significant strides in e-commerce, driven by government leadership and partnerships with the private sector. The government has embarked on developing a comprehensive e-commerce strategy to

facilitate digital trade and support small and medium-sized enterprises (SMEs) to access both local and international markets. This strategy is part of a broader digital economy agenda, aiming for inclusive growth and improved living standards. Initiatives have focused on creating an enabling environment for e-commerce through regulatory frameworks, digital skills development, and infrastructure improvements, showcasing a "whole-of-government" approach to digitalization. The efforts are also geared towards helping Rwanda progress towards exiting the group of least developed countries by leveraging digital trade (UNCTAD, 2023).

Estonia's Digital Transformation: Estonia is renowned for its leadership in digital literacy and infrastructure, which has been pivotal in supporting e-commerce and broader digital transformation. The country has one of the world's most advanced e-governance systems, providing over 96 government e-services to its citizens through the Irembo portal. This investment in digital infrastructure and services has given nearly all Estonians access to mobile broadband, facilitating the digitalization of financial services, healthcare, and administrative services. Estonia's digital transformation has been underpinned by substantial public investment, regulatory reforms, and a focus on increasing the affordability of digital devices and services. The private sector has played a crucial role in driving digitization, supported by a conducive policy environment that encourages innovation and entrepreneurship (World Bank, 2020). The Transformative Power of E-commerce in Modern Business' Global Reach and Market Penetration: E-commerce transcends technological boundaries, extending its influence into both developed and emerging economies. This universal penetration demonstrates its pivotal role in catalyzing business growth across varied geographic and socio-economic contexts. The global embrace of e-commerce is a testament to its capacity for market integration and its contribution to economic inclusivity, offering a robust platform for bridging disparate market segments (World Bank, 2018).

Enhancing Operational Sustainability: Beyond its revenue-generating capabilities, e-commerce serves as a catalyst for operational sustainability and efficiency. By reducing dependence on physical storefronts, e-commerce platforms help in curtailing the environmental footprint traditionally associated with retail commerce. Moreover, these digital platforms are instrumental in promoting eco-friendly products and practices, aligning with broader objectives of environmental stewardship and social responsibility (The World Bank Annual Report, 2018).

Deepening Consumer Engagement through Personalization: The digital landscape offers unprecedented insights into consumer behaviors, enabling businesses to tailor their offerings with remarkable precision. Utilizing advanced data analytics, companies can significantly enhance the personalization of the shopping experience, thereby not only boosting sales but also fostering customer loyalty and retention. This shift towards data-driven customization represents a significant evolution in strategies for consumer engagement (Brenner, 2007).

Operational Agility for Market Adaptability: E-commerce platforms embody flexibility, allowing businesses to scale operations responsively in line with market fluctuations. This agility is crucial for mitigating the risks associated with global market volatility, facilitating timely adjustments to consumer preferences and emerging trends (Chaffey, 2009).

Marketplace Democratization and Strategic Insight: Highlighting the broader advantages of e-commerce, Allam Jaas (2022) notes its role in democratizing the marketplace. E-commerce levels the competitive terrain, granting small and medium-

sized enterprises unparalleled access to the global market. The capacity for instant data analysis and adaptation underscores the strategic value of e-commerce, not just as a transactional medium but as an essential instrument for real-time market research and strategic development.

Learning from the Ruhr Valley's Economic Transformation: The Ruhr region in Germany serves as an exemplar of successfully navigating the transition from coal-centric industries to a green and knowledge-based economy. This transformation was marked by a significant reduction in coal mining workforce from nearly 480,000 workers in 1955 to 3,371 by 2018, underscoring a shift towards service jobs and economic restructuring critical for the region's survival. The Ruhr Development Program initiated in 1968 and subsequent initiatives like the Future Initiative for Coal and Steel Regions in 1987 played pivotal roles in supporting infrastructure development and technological competitiveness, contributing to the region's resilience and adaptability (World Resources Institute). Moreover, the Ruhr's transformation into a university stronghold and a hub for the creative industry, notably with the Zollverein Coal Mine Industrial Complex in Essen becoming a UNESCO World Heritage Site, illustrates the potential for post-industrial regions to reinvent themselves. These efforts not only fostered new economic sectors but also emphasized environmental sustainability and cultural preservation, offering valuable lessons for regions undergoing similar transitions (deutschland.de)

2.5. Insights from western Macedonia and comparable towns on e-commerce integration

The exploration of Western Macedonia and comparable locales transitioning towards e-commerce integration highlights key strategies vital for successful digital adoption. This inquiry emphasizes the significance of visionary leadership, strategic foresight, collaborative efforts, and the imperative of securing financial resources. The leadership paradigms set by Jeff Bezos (Amazon), Jack Ma (Alibaba), and Tony Hsieh (Zappos) underscore the pivotal role of innovative, adaptable, and people-centric approaches in overcoming the hurdles and exploiting the possibilities inherent in digital marketplaces. Bezos' commitment to innovation and customer satisfaction, Ma's resilience and entrepreneurial zeal amidst challenges, and Hsieh's focus on organizational culture and excellence in customer service represent diverse yet synergistic methodologies to e-commerce triumph and crisis navigation. These instances serve not merely as practical illustrations of leadership principles propelling e-commerce expansion but also provide crucial lessons for leaders in evolving economies keen on capitalizing on digital transformation opportunities.

Visionary Leadership: Effective leadership is paramount in motivating businesses to recognize and exploit the extensive opportunities presented by e-commerce. Visionary leaders facilitate significant organizational and economic transitions by inspiring confidence and directing strategic change (Cai, Fan, & Wang, 2023; Hunt, Boal, & Dodge, 1999). Such leadership catalyzes the adaptation to digital marketplaces, guiding small businesses through the intricacies of digital transformation.

Strategic Planning: Developing bespoke strategies for small businesses is crucial in addressing the multifaceted challenges of e-commerce integration. Strategic planning encompasses identifying and mitigating online frauds, which have resulted in losses exceeding \$40 billion U.S. dollars in 2022. This underscores the necessity for

comprehensive strategies to detect and counteract vulnerabilities, safeguarding businesses from escalating online threats (Chevalier, 2023; Gandrita et al., 2023; Pires & Aisbett, 2003). **Active Collaboration:** The amalgamation of resources, expertise, and best practices through collaboration among diverse stakeholders enhances the effectiveness of e-commerce strategies. This collaborative approach facilitates the sharing of insights and solutions, promoting the development of robust e-commerce ecosystems that can withstand evolving market demands and technological advancements (Valdez-Juárez et al., 2021; Brunetti et al., 2020; Mariani et al., 2022). **Access to Financial Resources:** Securing access to financial resources via funding programs and initiatives is indispensable for small businesses aiming to invest in the necessary infrastructure and technology for e-commerce. Financial support removes significant barriers to digital adoption, enabling businesses to scale their operations and compete effectively in the digital arena (Saarikko et al., 2020). By synthesizing these insights and cultivating a conducive ecosystem, Western Macedonia and similar regions can adeptly navigate their economic transitions, diversify their economies, and capitalize on the growth opportunities afforded by e-commerce. This comprehensive approach, underpinned by rigorous academic analysis, highlights the multifaceted strategies required to facilitate sustainable economic development through digital integration. **E-commerce Demographics in Greece: Insights from the Hellenic Statistical Authority:** This section draws upon data provided by the Hellenic Statistical Authority to delineate the profile of online consumers in Greece. The authority's findings serve as a foundation for understanding the demographic characteristics influencing e-commerce adoption in the region. Online consumers in Greece are primarily concentrated in the age groups 16-24 (23.9%), 25-34 (37.2%), and 35-44 (20.9%). However, the penetration rate among individuals aged 65 and above remains very low at 1.5%. This suggests that younger generations are more inclined towards e-commerce. Additionally, the majority of e-commerce users in Greece are tertiary educated (61.5%) and employed (55%). This indicates that educated individuals with stable employment are more likely to engage in online shopping. The low penetration of e-commerce in Greece, compared to other European countries, can be attributed to several factors:

- **Consumption Habits (58%):** Greek consumers still prefer traditional, in-person shopping experiences, and this habit is a significant barrier to the growth of e-commerce.
- **Lack of Confidence in Online Data Security (44.9%):** Many Greek consumers are hesitant to disclose personal information online due to concerns about data security and privacy.
- **Lack of Need for Online Shopping (35.6%):** Some consumers may not see a compelling need for online shopping, especially when they can make purchases through direct contact.

In summary, trust and security concerns, as well as consumption habits and the perceived need for online shopping, significantly influence the adoption of e-commerce in Western Macedonia and Greece as a whole. Small businesses and e-commerce platforms should prioritise addressing these concerns to encourage the growth of digital marketplaces in the region.

3. Data and Methodology

Lessons from E-commerce Adoption in Western Macedonia

Our research deployed a mixed-methods approach to delve into the impact of leadership on e-commerce growth amidst Western Macedonia's shift away from lignite dependence. Initially, we conducted a quantitative survey targeting a broad spectrum of local businesses and stakeholders to measure e-commerce adoption rates and the perceived role of leadership in this evolution. Through a stratified sampling strategy, we ensured diverse sector representation among our participants, leading to a substantial response from 100 surveyed individuals, of which 71 provided usable responses. This participant group comprised 49 women and 22 men, all above the age of 18, with varied educational backgrounds including 21 economics students, 39 university degree holders, and others with high school education or higher. Subsequently, we engaged in semi-structured interviews with a purposive sample of 34 key informants, encompassing local business leaders, policymakers, and e-commerce experts, aiming to uncover deeper insights into leadership's facilitative role in e-commerce adoption and its strategies for managing the economic transition challenges. Quantitative data underwent statistical analysis, employing Pearson Chi-Square and Somers' D tests to pinpoint significant correlations and trends. Concurrently, thematic analysis applied to the qualitative interview data unearthed patterns and insights into leadership practices, the hurdles of adopting e-commerce, and strategic crisis management. This comprehensive methodological approach allowed for a nuanced exploration of the critical role leadership plays in advancing e-commerce initiatives within a transitioning economy, providing both a broad quantitative overview and in-depth qualitative understanding."

3.1. Findings

The transition from lignite-dependent economies to digital-forward marketplaces presents unique challenges and opportunities for leadership in fostering e-commerce growth and navigating crisis management. The foundational role of transformational leadership in promoting organizational innovation and creativity, as established by Gumusluoglu and Ilsev (2009), becomes particularly salient in such transitions. These leaders' ability to inspire creativity at both individual and organizational levels is crucial for driving the e-commerce adoption essential for economic revitalization in post-lignite regions.

Herold, Fedor, Caldwell, and Liu (2008) emphasize transformational leadership's significant impact on employees' commitment to change initiatives, underscoring the importance of leadership in managing the multifaceted crises that accompany economic transitions. This is especially relevant in post-lignite urban transitions where the shift to digital economies can entail substantial organizational and societal changes. Moreover, Molla and Licker's (2005) exploration of e-commerce adoption in developing countries highlights the relevance of perceived organizational and environmental readiness in such transformations. In post-lignite contexts, where economic and infrastructural challenges are prevalent, leadership's role in enhancing organizational readiness and navigating the environmental landscape becomes crucial for the successful adoption of e-commerce. The mediating role of trust and team performance in the relationship between transformational leadership and service quality, reflects the nuanced dynamics of building a resilient e-commerce ecosystem

within transitioning economies. This aspect of leadership is vital in ensuring the continuity and growth of e-commerce initiatives amid the uncertainties of post-lignite economic restructuring. Additionally, the positive correlation between authentic leadership and technology acceptance, identified by Aziz et al. (n.d.), underscores the necessity for genuine, transparent leadership practices that foster trust and encourage the adoption of new technologies in transitioning regions. This becomes even more critical in crisis management scenarios, where clear, authentic communication and decision-making can significantly impact organizational resilience and adaptability.

Finally, Harmawan, B. N. (2022) and Halbach, M., & Gong, T. (2013) studies on leadership behaviors and mobile-commerce acceptance provides insight into the specific leadership practices that can facilitate technological adaptation in the banking sector. Such findings are applicable to broader industrial contexts in post-lignite regions, where the strategic adoption of mobile-commerce and other digital technologies can serve as key drivers of economic redevelopment and sustainability.

E-commerce Adoption and Revenue Growth: Our analysis not only confirms a clear positive correlation between e-commerce adoption and revenue growth but also showcases the dramatic impact of digital integration on business performance. Specifically, 75% of businesses that have embraced e-commerce strategies report not just incremental, but significant sales increases, along with an expanded market reach that contrasts starkly with the experiences of non-adopters. Only 40% of businesses refraining from e-commerce integration noted any improvement in revenue, underscoring the missed opportunities for growth and market penetration. This disparity is critical in regions undergoing significant economic transitions, such as Western Macedonia, where e-commerce emerges as a vital lifeline for businesses striving to adapt to the changing economic landscape. The findings draw a parallel with the insights of Valdez et al. (2021), emphasizing the necessity for businesses to navigate through evolving markets by adopting adaptive and forward-thinking strategies.

Leadership's Integral Role: The analysis delves deeper into the essence of leadership within the e-commerce adoption process. With a significant correlation identified between proactive leadership and e-commerce growth (Pearson Chi-Square = 7.065, $df = 3$, $p = 0.070$; Likelihood Ratio = 8.445, $df = 3$, $p = 0.038$), the study underscores the indispensable role of visionary leadership in navigating businesses towards digital success. Leadership's influence extends beyond mere decision-making; it is about fostering a culture of innovation, ensuring seamless access to essential e-commerce resources, and empowering those with prior digital exposure to leverage their experiences for broader organizational gain. This nuanced understanding of leadership's impact is echoed in the transformative leadership models explored by Podsakoff et al., DeRue (2011), and Lawrason et al. (2023), highlighting the multifaceted nature of leadership in driving organizational change and technological adoption.

E-commerce Awareness and Data Privacy Concerns:

Furthermore, our research highlights a critical aspect often overlooked in the rush towards digitalization—data privacy concerns. A moderate yet significant relationship between e-commerce awareness and data privacy concerns was observed ($\Phi = -0.295$, $p = 0.100$; Cramer's $V = -0.295$, $p = 0.100$), indicating a pivotal area where leadership can make a difference. By addressing and mitigating privacy concerns, leaders can not

only foster e-commerce adoption but also build a foundation of trust and security that is paramount in the digital age. This aspect of leadership in navigating the complex landscape of digital transactions and privacy concerns resonates with the discussions by Hyun Shik Yoon & Luis G. Occeña (2015) and Grabner-Kräuter (2004), who stress the importance of robust security measures and

transparency.

4. Survey insights and leadership's pivotal role

Community Perspective on E-commerce: The survey sheds light on the community's perspective, revealing that a substantial 68.8% view e-commerce as a key economic stabilizer during downturns. This significant acknowledgment underscores the strategic importance of e-commerce in bolstering local economic resilience, a sentiment widely shared across the community.

Consensus on Leadership for E-commerce Success: Echoing the community's high regard for e-commerce, an overwhelming 91.2% of respondents identified effective leadership as 'vital' or 'very important' for e-commerce integration success. This overwhelming consensus reflects a shared belief in the power of leadership to guide digital transformation efforts, showcasing the community's readiness to embrace change under adept leadership.

Graph Analysis and Community Engagement: The comprehensive graphical data analysis not only corroborates these insights but also provides a vivid depiction of the community's engagement and the tangible benefits realized from e-commerce adoption. The detailed examination of responses highlights nearly unanimous agreement on the essential qualities of leadership for promoting e-commerce, illustrating the community's proactive and engaged stance towards fostering digital economic growth strategies.

Leadership's Expanded Role in Motivating E-commerce Adoption and Fostering Collaboration: The narrative further explores the community's belief in leadership's ability to inspire e-commerce adoption and its effectiveness in fostering collaboration and partnerships. The detailed graphical interpretations reveal a community confident in leadership's positive impact, yet reflective of the diverse views on its capacity to promote a collaborative business environment conducive to e-commerce growth.

Community Perspectives on E-commerce and Leadership's Role: This graph illustrates the community's strong belief in the transformative power of e-commerce and the indispensable role of leadership in facilitating this digital transition. An impressive 68.8% of survey participants acknowledge e-commerce as a vital stabilizer for the local economy during downturns, highlighting its potential to drive economic resilience. Furthermore, a remarkable 91.2% of respondents emphasize the importance of leadership in e-commerce success, rating it as either 'vital' or 'very important'. This consensus underscores the critical role of adept leadership in e-commerce integration, where strategic foresight, influence, and resource allocation are pivotal in equipping businesses for the digital marketplace.

Key insights include: Widespread Agreement on Leadership's Role: A striking 97.0% of participants, excluding the missing response, affirmed their ability to identify

essential leadership qualities for promoting e-commerce, indicating a broad consensus on the value of effective leadership.

Minimal Ambiguity: The responses demonstrate a clear understanding and minimal ambiguity among participants regarding the role of leadership in e-commerce, with almost unanimous agreement and negligible outliers.

Community Involvement: The high percentage of valid responses reflects an engaged and informed community that recognizes and values the importance of leadership in navigating the e-commerce adoption process.

These findings, depicted in graph, encapsulate the community's engaged stance and collective insight into the pivotal role of leadership in harnessing the economic and strategic benefits of e-commerce.

Identifying Leadership Qualities for E-commerce Promotion: This graph visualizes the responses to the survey question: "Can you identify qualities an effective leader should possess to promote e-commerce in our town?" Among the 34 respondents, a compelling 94.1% (32 respondents) answered affirmatively with "Yes," highlighting a strong community consensus on the critical role of leadership in e-commerce development. An interesting observation is the single outlier or potential typographical error, with one respondent indicating "Yes," representing 2.9% of the total or 3.0% of valid responses. Additionally, there was one missing response, accounting for 2.9% of the total. The survey further revealed that 44.1% of respondents view leadership as 'vital' for driving e-commerce success, with another 47.1% considering it 'very important.' This results in a combined 91.2% of participants recognizing leadership's significance as either 'vital' or 'very important' for e-commerce success in small towns. In stark contrast, a mere 2.9% regarded leadership's role as having 'very little' importance, with another 5.9% deeming it 'not at all' important.

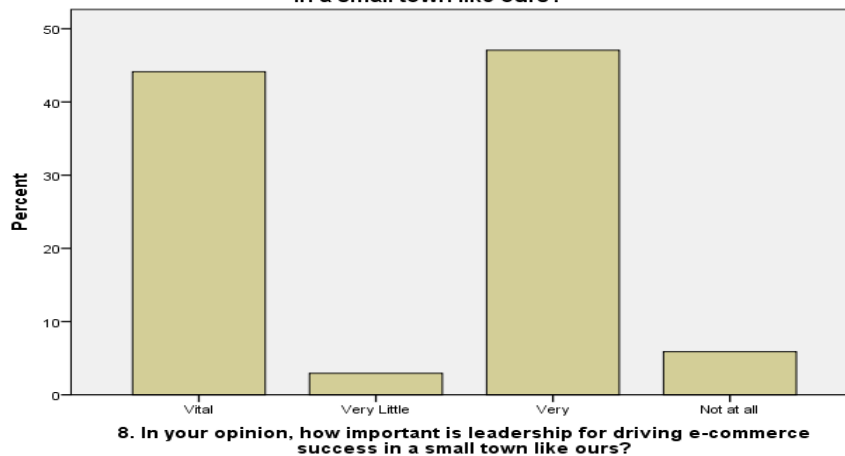
Key Insights: Predominant Belief in Leadership's Influence: An overwhelming 85.3% of total participants (or 87.9% of valid responses) believe leadership can effectively inspire and motivate local businesses towards e-commerce adoption, showcasing the perceived impact of leadership in the digital economy transition.

Presence of Ambiguity: A modest segment of the community, representing 11.8% of total participants (or 12.1% of valid responses), remains uncertain about leadership's capacity to facilitate this change, indicating areas for further exploration and discussion.

High Level of Engagement: With 97.1% valid responses, the data reflects robust community engagement and a keen interest in understanding the nuances of leadership in e-commerce promotion.

Minimal Data Oversight: The minimal missing data, constituting only 2.9% of total responses, underscores the survey's overall reliability and the community's commitment to contributing valuable insights on this topic. Through this graphical representation, we observe not only the community's overwhelming belief in the importance of leadership qualities for e-commerce promotion but also a high level of engagement and minimal ambiguity among participants. These insights underline the community's readiness to support leadership initiatives that drive e-commerce growth

8. In your opinion, how important is leadership for driving e-commerce success in a small town like ours?



Leadership's Role in Motivating E-commerce Adoption

This graph showcases the community's perspective on whether leadership can inspire and motivate local businesses to adopt e-commerce, based on feedback from 34 participants. A significant majority, 85.3% (29 respondents), affirmed with a "Yes," recognizing leadership's positive influence in encouraging e-commerce adoption. Meanwhile, 11.8% (4 respondents) expressed uncertainty with "I don't know," reflecting some ambivalence regarding leadership's effectiveness in this area. Additionally, one response was missing, accounting for 2.9% of total participation, indicating either abstention or data collection oversight.

Key Insights: Uncertainty about Leadership's Capacity: Despite a strong positive response, there's a notable degree of uncertainty (55.9% of total participants and 61.3% of valid responses) about leadership's ability to foster collaboration and partnerships essential for e-commerce growth among local businesses. **Positive Sentiments on Collaboration:** A portion of the community, representing 35.3% of the total and 38.7% of valid responses, acknowledges the potential of leadership to encourage collaboration and partnerships, indicating optimism about leadership's role in facilitating a collective approach to e-commerce. **High Engagement with Some Omissions:** The survey's high response rate (91.2%) signifies robust community engagement, though there were some omissions (8.8% of total participants), suggesting areas where engagement could be improved. **Absence of Negative Responses:** Notably, there were no direct negative responses regarding leadership's role in promoting e-commerce collaborations, hinting at either a general optimism or a neutral stance among respondents.

The data visualization reveals a community largely in agreement on the positive impact of leadership in steering local businesses towards e-commerce, with some reservations about its capacity to drive collaboration. The absence of negative feedback on leadership's role in fostering e-commerce partnerships suggests an underlying optimism or neutrality, pointing to potential areas for further engagement and exploration.



Assessing Leadership's Influence on E-commerce Collaboration

This graph presents the community's views on whether leadership can effectively foster collaboration and partnerships among local businesses to enhance e-commerce growth. Out of 34 respondents:

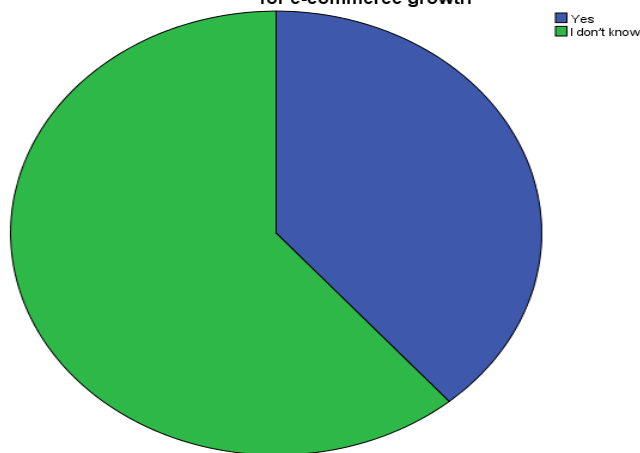
- 12 individuals, representing 35.3% of the total and 38.7% of those providing valid responses, affirmatively believe that leadership is crucial in facilitating such collaborations, with a response of "Yes."
- Conversely, 19 respondents, accounting for 55.9% of the total and 61.3% of valid answers, expressed uncertainty about the capacity of leadership in this domain, selecting "I don't know."
- Additionally, there were 3 missing responses, comprising 8.8% of the total, suggesting either a deliberate abstention by some participants or a lapse in data recording.

Key Insights:

- **Optimism about Leadership's Role:** A substantial portion of participants acknowledges the vital role leadership plays in encouraging collaborative efforts and partnerships for e-commerce development, indicating an optimistic view of leadership's potential to drive e-commerce growth.
- **Ambivalence Regarding Leadership's Capacity:** The majority's uncertainty signals a need for further clarification and exploration into how leadership can more effectively promote collaboration within the e-commerce sector, highlighting an area ripe for additional focus and intervention.
- **Engagement and Data Integrity:** The notable number of missing responses points to areas where data collection could be enhanced, emphasizing the importance of ensuring all participants are fully engaged and responses accurately captured.

The visualization underscores a nuanced understanding within the community regarding the role of leadership in e-commerce collaboration. While there's a clear recognition of leadership's importance, the prevalent uncertainty and missing data underscore the complexity of effectively leveraging leadership for fostering e-commerce partnerships and the need for targeted strategies to address these challenges.

20. Can leadership foster collaboration and partnerships among local businesses for e-commerce growth



Concluding Synthesis and Forward-Looking Insights:

This extended analysis, enriched by in-depth survey data and comprehensive graphical interpretations, meticulously navigates the terrain of leadership's influence on e-commerce adoption and the cultivation of collaborative business ecosystems in Western Macedonia. The significant affirmation of leadership's role juxtaposed with the noted ambivalence toward collaboration and partnerships underscores the complexity of digital transformation efforts, highlighting areas for further exploration and development. As Western Macedonia embarks on its post-lignite transition, these enriched insights not only affirm the critical role of adept leadership in steering economic revitalization through e-commerce but also spotlight the community's enthusiasm and potential areas for growth in harnessing digital opportunities for sustainable economic development.

5. Discussion

Our study, grounded in existing literature, highlights the significant potential of e-commerce to enhance revenue growth and expand market reach for businesses in Western Macedonia. Echoing previous research, we identify e-commerce integration as essential for businesses aiming to stay competitive in the rapidly changing digital marketplace. A key finding is the clear relationship between effective leadership and successful e-commerce adoption. This demonstrates the critical role of progressive leadership in facilitating the transition to digital platforms, ensuring businesses access necessary resources and technology. Local leadership in Western Macedonia serves as an example of how community stakeholders can guide SMEs through complex economic transitions. The European Green Deal aims to transform the EU into a competitive, resource-efficient economy with net-zero greenhouse gas emissions by 2050. Post-COVID-19, the Green Deal has become central to Europe's recovery strategy, with a significant portion of the NextGenerationEU Recovery Plan funds allocated to it. The European Council's plan calls for at least a 55% reduction in net greenhouse emissions by 2030, compared to 1990 levels. Our survey highlights a strong recognition of the importance of leadership in e-commerce success. A significant 91.2% of respondents view leadership as 'vital' or 'very crucial' for e-commerce success in small-town settings, while only a small fraction sees it as of 'little' or 'no' importance. These findings are depicted in the subsequent graph. The "PANEFKOLO" website, funded by the Kozani EBE and initiated by the Ptolemaida-Eordaia Trade Association,

stands out as an exemplary case. It illustrates the Chamber of Commerce's foresight by providing a vibrant marketplace for local businesses and promoting them through unique discounts, showcasing how leadership can effectively drive e-commerce growth during post-lignite transitions. Additionally, regional initiatives like "BRIDGES" and "PrioritEE" align with our findings, demonstrating a regional commitment to sustainable development. "Anko BRIDGES" aims to stimulate growth in specific areas, while "PrioritEE" focuses on energy efficiency in public infrastructure, in line with the EU's Green Deal goals. The crux of our research underscores the pivotal role of leadership in the e-commerce transformation of Western Macedonia, particularly against the backdrop of its post-lignite urban shifts. Our insights not only provide a roadmap for the region but also lessons for other areas undergoing similar transitions. Western Macedonia's strategy, rooted in visionary leadership and e-commerce adoption, could serve as a model for navigating economic challenges and leveraging the e-commerce opportunity. Further broadening our analysis, the study by Gao et al. (2023) on MSMEs during the COVID-19 pandemic offers a global comparative perspective, demonstrating the critical role of e-commerce and digital marketing in enhancing both financial performance and sustainability among small businesses. These findings resonate with our research, underscoring e-commerce as a pivotal tool for economic resilience across diverse economic contexts, including Western Macedonia. Such comparative insights highlight the universal applicability of digital transformation strategies, driven by effective leadership, in fostering business growth and sustainability amid global challenges. In the evolving landscape of e-commerce, leadership plays a pivotal role in navigating the complexities of growth and crisis management. The interplay between innovative business models and entrepreneurial capabilities emerges as a cornerstone for organizational resilience, particularly in the context of post-lignite urban transitions. This dynamic underscores the necessity for leadership that is not only adaptive but also forward-thinking, capable of leveraging digital transformation to foster sustainable economic development. Such leadership, characterized by its ability to anticipate and mitigate crises, proves instrumental in guiding communities through the challenges of economic restructuring. The integration of these elements into the fabric of organizational strategy and culture signifies a paradigm shift towards more resilient and agile business practices, essential for thriving in the digital economy.

5.1 Limitations

It's important to acknowledge this study's limitations. The findings, specific to Western Macedonia, may not be universally applicable due to regional socio-economic differences. The reliance on self-reported data could introduce bias, and the primary focus on e-commerce benefits suggests a need for more balanced research. To enhance the practical implications of our findings for local leaders and policymakers, the research suggests the following strategies:

Leadership Development Programs Implement training for local leaders focusing on transformational leadership skills, emphasizing digital literacy and e-commerce strategy. This aims to equip leaders with the necessary tools to drive e-commerce adoption and digital transformation effectively.

Policy Support for E-commerce Adoption: Policymakers should consider creating incentives for businesses that adopt e-commerce solutions, such as tax breaks or grants for digital infrastructure development. This can lower the barriers to e-commerce entry for small and medium-sized enterprises.

Strengthening Digital Infrastructure: Invest in robust digital infrastructure to support e-commerce activities, ensuring businesses have access to high-speed internet and secure online transaction systems. This foundational step is crucial for facilitating a smooth transition to digital commerce.

Community Engagement and Education: Launch community-based programs to raise awareness about the benefits of e-commerce, targeting both businesses and consumers. Educational initiatives could include workshops, online resources, and support services to assist businesses in navigating the e-commerce landscape.

Cross-Sector Collaboration: Encourage partnerships between the government, private sector, and educational institutions to foster an ecosystem that supports e-commerce growth. Collaborative efforts can lead to innovative solutions and provide businesses with the resources and knowledge needed for successful online operations.

5.2 Future Research

This study opens several avenues for further investigation, prioritized for their potential impact: **Longitudinal Study:** A longitudinal study to track the effects of e-commerce adoption in Western Macedonia over time could provide insights into its long-term impact on revenue, market reach, and resilience. **Comparative Regional Analysis:** Comparing Western Macedonia's experiences with those of regions undergoing similar economic shifts could identify best practices and unique strategies.

Government Policies and Incentives: Investigating the role of government policies, incentives, and funding mechanisms on e-commerce adoption could offer guidance for policymakers. **Digital Literacy Initiatives:** Assessing the impact of digital literacy programs on business stakeholders' readiness for e-commerce could yield beneficial insights. By exploring these areas with diverse research methodologies, we aim to understand the complex implications of e-commerce adoption in regions facing significant economic changes. This comprehensive approach will inform strategies to promote economic growth and resilience. As businesses and regions adapt to globalization, technological advancements, and the growing significance of e-commerce, the importance of adaptability and leadership becomes increasingly clear. This study reaffirms that successful adaptation to these changes requires not only technological uptake but also strategic leadership and vision. Embracing e-commerce and evolving business models, while maintaining strategic direction, is essential for prosperity and sustainability in today's dynamic business environment.

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