

The impact of regional digitalization on financial performance and emerging market trends in the Italian Spirits Industry

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Abstract

The spirits market is undergoing significant transformation due to changing consumer preferences, increasing awareness of alcohol consumption, product diversification, and growing competitive pressure. In this context, digitalization represents a strategic lever through which firms can improve market responsiveness, operational efficiency, and consumer engagement. These dynamics are particularly relevant in territorially uneven contexts such as Italy, where regional digital readiness varies substantially.

This paper examines the relationship between the level of digitalization in Italian regions, as measured by the regional Digital Economy and Society Index (rDESI), and the financial performance of companies in the spirits sector, represented by the weighted average Digital Return on Assets (dROA). Using a representative sample of firms across Italian regions, the study investigates how digitalization impacts business performance and explores regional disparities in Italy. Additionally, the paper identifies emerging market trends in the spirits industry and links them with the rDESI - dROA analysis, providing insights into how digitalization enables companies to adapt to and capitalize on evolving market dynamics. The results highlight the importance of leveraging digital assets not only to enhance financial outcomes but also to align with consumer preferences and industry innovations. The findings aim to support businesses in developing strategies that bridge regional gaps in digitalization and optimize performance through trend-driven decision-making.

Keywords: Spirits; Emerging market trends; Digitization; Product Diversification.

1. Introduction

The spirits industry has experienced significant transformations over the past decade [1,2,3,4], driven by shifting consumer preferences, rising competition, and the rapid adoption of digital technologies [5,6]. Emerging market trends and changing consumption patterns have pushed companies to innovate and adapt to remain competitive [7]. These shifts underscore the growing importance of digital tools in understanding market dynamics and delivering tailored products and experiences [8]. The spirits industry is increasingly shaped by a combination of demand-side and supply-side pressures. On the demand side, consumers are showing greater attention to responsible drinking, health-oriented products, premium quality, authenticity, and experiential consumption. On the supply side, firms face growing competition, rising production costs, product diversification, and the need to differentiate through branding, digital channels, and data-driven market intelligence. Within this scenario, digitalization becomes not only an operational tool but also a strategic capability that may support firms in adapting to changing consumer preferences and sustaining competitiveness.

Digitalization has become a critical factor influencing business performance across all sectors [9,10]. At a regional level, indicators like the regional Digital Economy and Society Index (rDESI) measure digital readiness through dimensions such as connectivity, human capital, internet usage, Integration of Digital Technologies, and Digital Public Services [11]. Research highlights that higher digitalization levels correlate with improved business outcomes, enabling firms to enhance operational efficiency, customer engagement, and market positioning [12]. However, the direct impact of digitalization on financial performance in the spirits industry remains underexplored, particularly in light of regional disparities.

In Italy, such regional disparities are among the most significant in Europe, affecting income, productivity, government efficiency [13], and digitalization [14]. This study addresses these gaps by examining the relationship between regional digitalization levels (rDESI) and the financial performance of firms in the spirits industry, measured through a weighted digital Return on Assets (dROA), a constructed indicator of digital asset efficiency. Additionally, it explores how emerging market trends align with the rDESI – dROA correlation. Specifically, the study investigates: How do regional digitalization levels influence the financial performance of firms in the spirits industry? (RQ1) and How can firms align their strategies with emerging trends to maximize the benefits of digitalization? (RQ2).

The paper is structured as follows: Section 1 introduces the topic and reviews existing literature on digitalization, market trends, and business performance. Section 2 outlines the methodology, data sources, and analytical approach. The results section presents the rDESI – dROA relationship and its regional implications, along with emerging market trends. The final discussion and conclusion offer strategic recommendations for optimizing digital investments and adapting to evolving market dynamics.

2. Literature review

Digitalization has become a key driver of transformation across industries, offering businesses tools to innovate, optimize operations, and engage customers. Digital technologies improve organizational efficiency through enhanced data collection, decision-making, and customer interactions [15,16]. Investments in digital assets, particularly connectivity and digital platforms, have been shown to influence economic growth and firm performance positively [17,18]. However, this relationship is complex and often mediated by factors such as organizational structure [19,20], market dynamics [21], and regional digital readiness [22,23,24].

The alcohol and spirits industry has been particularly impacted by digitalization, with studies highlighting its role in product customization [27], supply chain optimization [28], and the rise of e-commerce and direct-to-consumer models [29,30]. Digitalization also enhances market intelligence, enabling firms to adapt to shifting consumer preferences [31]. Despite its benefits, regional disparities in digital readiness, measured by the regional Digital Economy and Society Index (rDESI) [14], significantly affect the effectiveness of digital adoption efforts.

Several studies have explored the relationship between digitalization and financial performance. Jarak & Ben Hamad (2022) [32] found that digital transformation can initially strain financial performance, particularly ROA and ROE, due to high investment costs, but offers long-term benefits such as increased market value and efficiency. Zeng et al. (2022) [33] revealed that digitalization improves firm performance, particularly in state-owned enterprises and regions with strong judicial transparency, emphasizing the strategic value of digital tools. Similarly, Huang & Cheng (2024) [34] demonstrated a positive correlation between Digital Transformation (DT) and financial outcomes in S&P 500 firms, with variations influenced by first-mover advantages and long-term value creation. In the spirits industry, these adaptations involve leveraging digital tools for marketing, production, and distribution to align with trends like sustainability and premiumization. However, gaps persist in understanding how regional digitalization levels, as measured by rDESI, translate into firm-specific financial performance, particularly in industries driven by emerging consumer preferences. Additionally, few studies examine regional disparities within a single country, such as Italy, where differences in digital readiness strongly influence business outcomes [35].

Building on RQ1 and RQ2 and the insights from the literature, the paper develops the following methodology.

3. Method

The study focused on the Italian Economic Activity codes 11.01.00 "Distillation, rectification, and blending of alcoholic beverages". It draws on data from the AIDA dataset to provide market research and statistical insights into spirits firms in Italian regions. The datasets require a subscription for full access (Last access, December 2024). AIDA is a commercial database provided by Bureau van Dijk that contains financial statements, balance-sheet data, company information, and accounting records for Italian firms. It is widely used for firm-level economic and financial analyses in the Italian context. Based on AIDA dataset, 80 spirits firms, located in different Italian regions were identified, starting from a population of 476 firms linked to the previous Italian Economic Activity codes. The firms' sample was filtered by the entire population by considering only those with net income more than 1 € million.

126 To evaluate whether the regional level of digitalization, where the sampled spirits firms are located,
 127 correlates with the efficiency of digital investments made by the same firms, and to examine how this
 128 correlation manifests, the study develops a statistical model that performs a correlation analysis
 129 between indices that include both digital and economic aspects. The model is also aimed at identifying
 130 which digital levers are most influential on the firms' economic performances. Furthermore, it's
 131 essential to consider that traditional Italian financial statements may not explicitly list a specific line
 132 item called digital assets. Therefore, to clarify this aspect, the research methodology identified
 133 elements related to digital assets by searching, supported by the use of keywords and search filters,
 134 intangible assets as Software, Digital Patents and Trademarks, Other Intangible Assets, Research and
 135 development" (R&D), if referring to digital projects, "Data" or "database" if the company invests in
 136 data science or big data. Additionally, the study focused on the analysis of the financial statements
 137 notes to provide detailed information about intangible assets, describing the allocation of funds for
 138 digital projects, software acquisitions or licenses, and technology investments. Based on average
 139 financial statements data in the time range 2021-2023, the analysis focused on the efficiency of
 140 investments made by firms, measured using a constructed indicator named Digital Return on Assets
 141 (dROA). This indicator is not the conventional ROA directly available from AIDA; rather, it
 142 estimates the efficiency of digital-related assets by relating revenues attributed to digital assets to the
 143 value of those assets. To estimate the share of total revenue attributable to digital assets, we assume
 144 that revenue is proportional to the value of the assets used to generate it:

$$145 \quad \text{Revenue on Digital Assets} = \text{Total revenue} * \frac{\text{Digital Assets}}{\text{Total Assest}}$$

146 *Revenue on Digital Assets*: Portion of total revenue attributable to digital assets.

147 *Total Revenue*: Total revenue of the firm.

148 *Digital Assets*: Value of digital assets held by the firm.

149 *Total Assets*: Total value of all assets held by the firm.

150

151 Based on this assumption the dROA is expressed by the following formula:

$$152 \quad dROA = \frac{\text{Revenue on Digital Assets}}{\text{Digital Assest}}$$

153 *dROA*: Return on Assets specific to digital assets.

154 *Revenue on Digital Assets*: Revenue generated from digital assets.

155 *Digital Assets*: Value of digital assets held by the firm.

156

157 Throughout the paper, dROA refers to this constructed indicator of digital asset efficiency and should
 158 not be confused with the conventional ROA directly available from AIDA.

159 To make the dROA representative of the geographical area (region), where the sampled firms are
 160 located, it is necessary to weight each firm's contribution based on their total assets and revenues
 161 combining these two aspects:

$$Weight_i = \sqrt{\frac{Total\ Assets_i}{\sum Total\ Assets}} * \sqrt{\frac{Revenue_i}{\sum Revenue}}$$

163 $Weight_i$: Weight assigned to firm i based on its total assets and revenue.

164 $Total\ Assets_i$: Total assets of firm i

165 $\sum Total\ Assets$: Sum of total assets of the sampled firms in the region.

166 $Revenue_i$: Total revenue of firm i

167 $\sum Revenue$: Sum of total revenue of the sampled firms in the region.

168

169

170 The weighted dROA for each firm is calculated for the years 2021, 2022, and 2023 using the
 171 following formula:

$$Weighted\ dROA_f = \sum (dROA_i * Weight_i)$$

173 $Weighted\ dROA_f$: Weighted dROA for a specific firm f .

174 $dROA_i$: dROA for firm i .

175 $Weight_i$: Weight assigned to firm i .

176

177 Additionally, the average weighted dROA is expressed by the arithmetic average of the values
 178 referred to the three years considered.

179 $Average\ Weighted\ dROA_f$

$$= \frac{Weighted\ dROA_{2021} + Weighted\ dROA_{2022} + Weighted\ dROA_{2023}}{3}$$

181 $Average\ Weighted\ dROA_f$: Average weighted dROA for a specific firm f , over three years.

182 $Weighted\ dROA_{2021}$: Weighted dROA for firm f in 2021.

183 $Weighted\ dROA_{2022}$: Weighted dROA for firm f in 2022.

184 $Weighted\ dROA_{2023}$: Weighted dROA for firm f in 2023.

185

186 The formula to express the Average Weighted dROA representative of the region is the following:

$$Average\ Weighted\ dROA_r = \sum_{i=1}^n \frac{Average\ Weighted\ dROA_{fi}}{i}$$

188 i = number of sampled firms for each region

189 *Average Weighted $dROA_r$* : Average weighted dROA representative of the region.

190 *Average Weighted $dROA_{fi}$* : Average weighted dROAs for all firms fi in the region.

191 n : Total number of sampled firms in the region.

192

193 To evaluate the regional level of digitalization, where the sampled spirits firms are located, this study
194 uses the regional Digital Economy and Society Index (rDESI) values estimated by Benecchi et al.
195 (2023) [14] for Italian regions. Therefore, rDESI is not recalculated in this study; rather, it is adopted
196 as an external regional indicator of digital readiness. The 2020 rDESI are structured around the same
197 five dimensions of EU DESI [11]: the infrastructure and the network usage (Connectivity), the
198 population's digital skills (Human Capital), the use of internet services by households (Use of
199 Internet), the use of digital technology by firms (Integration of Digital Technologies), and the level
200 of digital services offered by the local government (Digital Public Services). We compared two
201 different time range in the statistical model to evaluate the lagged effect of how the regional
202 digitalization level affected in the next three years on the efficiency of firms' digital investments. In
203 fact, the level of regional digitalization has a delayed effect on business performance. These delays
204 often result from the time required to implement, adapt, and fully leverage digital technologies within
205 companies and markets. In line with this assumption the adoption of digital innovations takes time to
206 spread among businesses and to be integrated into their processes [36]. Furthermore, companies need
207 to develop dynamic capabilities to adapt to digital change. This requires acquiring new skills,
208 reallocating resources, and restructuring business processes. These changes do not generate
209 immediate benefits but require a period of adjustment [37]. In addition, the impact of digitalization
210 can grow over time due to network effects (e.g., digital platforms, e-commerce) [38]. The more
211 companies or customers adopt digital technologies, the greater the collective and individual benefits.
212 The methodology employed the Min-Max normalization method to eliminate differences in scale
213 between variables and ensures the comparison and analysis among them on a common scale between
214 0 and 1. The hypothesis of the statistical model aimed to verify the existence of a linear relationship
215 between rDESI scores (x) and its five dimensions and the Average Weighted regions' Return on
216 Assets (ROA) (y). To determine the level of correlation, Pearson's correlation coefficient ($-1 < r < 1$)
217 and the coefficient of determination ($r^2 > 0.4$) were used. The consistency of the regression model
218 with the data was tested using a Student T-test and a Fisher F-test. Data analysis and elaboration were
219 conducted using the Statistical Package for the Social Sciences (SPSS) version 26.0.
220 Moreover, to highlight the emerging trends identified by the sampled firms, a specific analysis of
221 revenue diversification and segmentation, including the associated sales channels, was conducted.
222 This information was obtained through the examination of the notes and the management reports

attached to the financial statements. In particular by the analysis of the notes the study focused on identification of key revenue streams and segmentation of revenues by product categories and sales channels, and by the analysis of management reports it concentrated on the detection of the alignment of firms' strategies with key trends of spirits market. The results of this analysis are presented in the following section.

4. Results

A total of 80 spirits firms were identified across 19 Italian regions: 57 firms were located in Northern Italy, 13 in Central Italy, and 10 in Southern Italy. Table 1 reports the regional distribution of the sampled firms, together with the normalized dROA, rDESI scores, and rDESI sub-dimensions.

Table 1 Normalized Statistical Sample Dataset

Region	Average Weighted dROA 2021-2023	Number of Firms	rDESI	Connectivity	Human Capital	Use of Internet	Integration of Digital Technologies	Digital Public Services
Abruzzo	0.33	1	0.45	0.40	0.40	0.52	0.37	0.39
Basilicata	0.26	1	0.34	0.45	0.45	0.34	0.27	0.36
Calabria	0.10	1	0.34	0.23	0.51	0.30	0.36	0.24
Campania	0.48	3	0.42	0.67	0.35	0.35	0.34	0.32
Emilia-Romagna	0.94	7	0.62	0.68	0.63	0.70	0.47	0.64
Friuli-Venezia Giulia	0.67	5	0.55	0.61	0.59	0.65	0.35	0.53
Lazio	0.78	2	0.62	0.75	0.72	0.63	0.44	0.47
Liguria	0.62	1	0.54	0.73	0.57	0.53	0.31	0.50
Lombardia	1	17	0.66	0.66	0.70	0.76	0.53	0.67
Marche	0.53	1	0.42	0.42	0.40	0.59	0.23	0.41
Piemonte	0.89	10	0.60	0.61	0.68	0.58	0.57	0.48
Puglia	0.42	3	0.45	0.45	0.36	0.37	0.35	0.51
Sardegna	0.46	3	0.45	0.46	0.46	0.56	0.32	0.63
Sicilia	0	2	0.34	0.68	0.11	0.27	0.26	0.33
Toscana	0.74	3	0.57	0.61	0.55	0.69	0.48	0.57
Trentino-Alto Adige	0.80	5	0.58	0.50	0.63	0.63	0.59	0.59
Umbria	0.62	1	0.57	0.59	0.5	0.67	0.59	0.49
Valle d'Aosta	0.56	2	0.51	0.45	0.45	0.63	0.33	0.64
Veneto	0.83	12	0.56	0.66	0.57	0.55	0.33	0.71

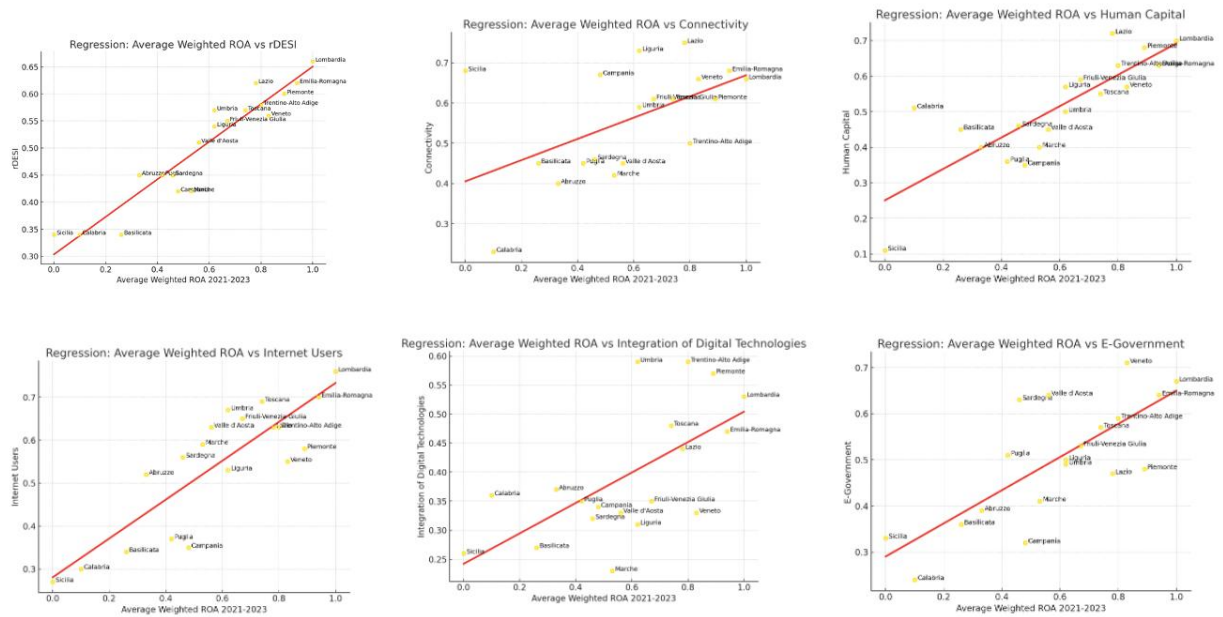
The regional DESI rankings highlight significant disparities between Northern and Southern Italy. Lombardia, Emilia-Romagna, and Lazio emerge as top-performing regions, while Calabria, Basilicata, and Sicilia rank lowest. Notably, Connectivity shows the least variability across regions,

likely due to national broadband initiatives, with Lazio, Liguria, and Emilia-Romagna leading. In contrast, Human Capital reveals the largest North-South divide, reflecting gaps in digital skills, with regions like Lazio and Lombardia outperforming Basilicata and Calabria.

The Integration of Digital Technologies dimension further emphasizes the divide, although the gap narrows in e-commerce, which benefits service-oriented economies like Trentino-Alto Adige and Piemonte. Similarly, Internet Usage and E-Government follow this trend, with Northern regions like Veneto and Lombardia achieving higher scores due to better adoption of digital tools and accessible online public services, while Southern areas, including Sicilia and Calabria, lag behind.

The study of Average Weighted dROA for 2021–2023 across nineteen Italian regions reveals significant regional disparities in financial performance among firms in the spirits sector. Lombardia reported the highest dROA (1.00), followed by Emilia-Romagna (0.94), Piemonte (0.89), and Veneto (0.83), reflecting strong financial outcomes. In contrast, Sicilia (0.00), Calabria (0.10), and Basilicata (0.26) recorded the lowest values, highlighting notable underperformance. Regions like Lazio (0.78), Toscana (0.74), and Trentino-Alto Adige (0.80) demonstrated moderate results, while Campania (0.48), Sardegna (0.46), and Puglia (0.42) fell below the national upper range. These findings underscore considerable variability in dROA, emphasizing the need to examine regional factors driving financial disparities in the spirits sector. The analysis of the relationship between the Average Weighted dROA (Return on Assets) and the digitalization levels of Italian regions, as measured by rDESI and its dimensions, reveals notable patterns that align with the study's objectives. The results demonstrate a strong and consistent relationship between regional digitalization indicators and the financial performance of firms in the spirits sector, as evaluated through their weighted dROA for the period 2021–2023.

Figure 1 Regression Analysis



262

263 The regression analysis of rDESI against Average Weighted dROA indicates that approximately 62%

264 of the variation in dROA can be explained by the regional level of digitalization ($R^2=0.62$). The

265 regression model suggests a strong positive correlation, with a slope (β) of 1.34, indicating that higher

266 rDESI scores are associated with increased financial performance. Regions such as Lombardia and

267 Emilia-Romagna, which exhibit the highest rDESI scores, also report the highest dROA values, while

268 regions with lower rDESI scores, such as Calabria and Sicilia, show significantly lower dROA.

269 Among the individual dimensions of rDESI, Connectivity emerges as the most significant predictor

270 of dROA. The regression model for Connectivity shows a slope of 1.48 and an R^2 value of 0.65,

271 indicating a strong positive relationship. Regions with robust digital infrastructure, such as Lazio,

272 Lombardia, and Emilia-Romagna, demonstrate superior financial outcomes, while regions with

273 weaker infrastructure, such as Sicilia and Calabria, exhibit lower dROA values.

274 The dimension of Integration of Digital Technologies also shows a significant positive correlation

275 with dROA, with a regression slope of 1.10 and $R^2=0.52$. This suggests that the adoption of ICT tools

276 by firms contributes notably to their financial performance, particularly in regions like Toscana,

277 Friuli-Venezia Giulia, and Trentino-Alto Adige. These regions, which demonstrate strong adoption

278 of digital technologies, achieve higher dROA compared to those with weaker adoption levels.

279 Moderate relationships are observed for the dimensions of Human Capital and Use of Internet, with

280 R^2 values of 0.48 and 0.41, respectively. Human Capital, which reflects the digital skills of the

281 regional population, demonstrates a regression slope of 0.96, suggesting that higher levels of digital

282 competence are linked to improved firm performance. Similarly, Use of Internet, reflecting the usage

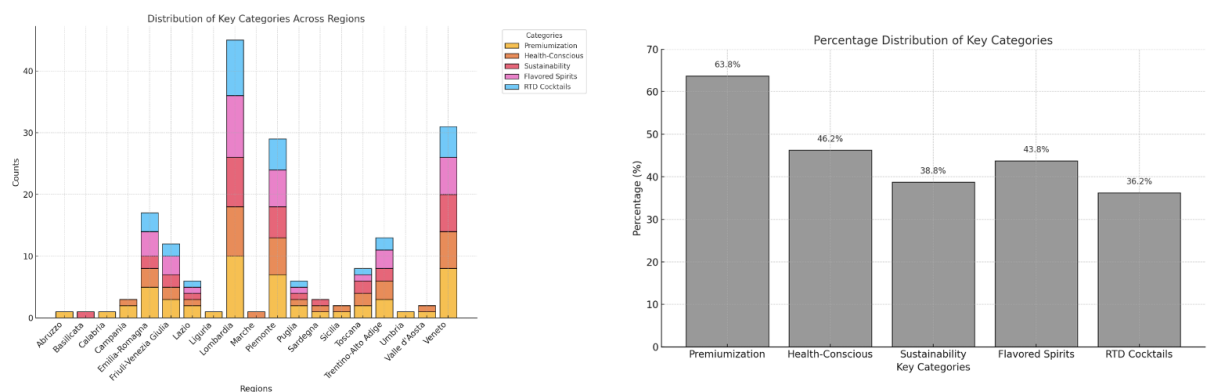
283 of internet services by households, shows a regression slope of 0.89, indicating a positive but

284 somewhat weaker relationship with dROA.

285 The final dimension, Digital Public Services, also displays a moderate correlation with dROA, with
286 an R^2 value of 0.43 and a regression slope of 0.92. Regions such as Veneto and Emilia-Romagna,
287 which report high levels of digital public services, achieve better financial outcomes than regions
288 with lower levels.

289 The findings collectively indicate that regional digitalization levels, particularly in terms of
290 connectivity and the integration of digital technologies, play a significant role in shaping the financial
291 performance of firms in the spirits sector. These results provide a foundational understanding of how
292 different aspects of digitalization contribute to regional disparities in firm outcomes, aligning with
293 the research aim of examining the interplay between digitalization and financial performance in this
294 sector.

295 **Figure 2 Distribution of Key Categories across regions and Percentage distribution of Key**
296 **Categories**



297

298 Figure 2 reports the regional distribution and percentage distribution of the main market trend
299 categories ("Premiumization," "Health-Conscious," "Sustainability," "Flavored Spirits," and "RTD
300 Cocktails") identified among the sampled firms. The specific analysis of revenue diversification and
301 segmentation, including the associated sales channels, highlighted key emerging trends in the spirits
302 industry including: *Premiumization and Craft Spirits* (63% of the sample) - the rising demand for
303 high-quality products has spurred growth in premium and craft spirits. Consumers are increasingly
304 willing to pay more for quality, leading to the proliferation of craft distilleries offering small-batch,
305 artisanal products. This trend spans multiple spirits categories, such as whiskey, gin, tequila, and
306 vodka, with a focus on authenticity and locally sourced ingredients. Firms located in Lombardia (10)
307 and Veneto (8) lead in Premiumization, showcasing the dominance of these geographical areas as
308 central hubs for high-quality and craft production. *Health-Conscious and Wellness-Oriented Spirits*
309 (46.2% of the sample) - health and wellness are becoming major factors in spirits consumption. Low-
310 alcohol and non-alcoholic beverages are gaining popularity, as are spirits with "clean labels", which
311 emphasize natural ingredients and health benefits, such as organic, gluten-free, or low-sugar options.

312 Firms located in Piemonte and Friuli-Venezia Giulia stand out as leaders in this segment, reflecting
313 their innovation in low-alcohol, non-alcoholic, and "clean-label" beverages. *Sustainability and*
314 *Ethical Practices* (38.8% of the sample) - sustainability is a growing priority for consumers.
315 Distilleries are responding by adopting eco-friendly packaging, ethical sourcing, carbon-neutral
316 production, renewable energy use, and waste reduction practices, which resonate with
317 environmentally conscious customers. *Flavored and Experimental Spirits* (43.8% of the sample) -
318 flavored spirits, especially in vodka, rum, and tequila categories, are on the rise. Consumers are
319 seeking unique, exotic flavors such as fruit, botanicals, spices, and even experimental combinations
320 like smoked or savory infusions. Crossover flavors, like whiskey infused with coffee or gin with
321 elderflower, are also gaining popularity. *Ready-to-Drink (RTD) Cocktails* (36.2% of the sample) - the
322 RTD cocktail segment has seen explosive growth, driven by consumer demand for convenient,
323 portable, and high-quality pre-mixed cocktails. These products offer premium alternatives to
324 traditional beverages, with a focus on natural ingredients, reduced sugars, and unique flavor profiles.
325 At the regional level, the results reveal significant variability in the adoption of key trends across
326 sampled firms. Lombardia leads with the highest number of firms across all categories, including
327 Premiumization (10 firms), Flavored Spirits (10), and RTD Cocktails (9), reflecting its strong market
328 presence and innovation. Veneto follows closely, with notable contributions in Premiumization (8)
329 and Health-Conscious Spirits (6), while Piemonte shows strong activity in Premiumization (7) and
330 Flavored Spirits (6), emphasizing artisanal production. Emilia-Romagna and Friuli-Venezia Giulia
331 display balanced yet moderate contributions, particularly in Premiumization and Flavored Spirits.
332 Regions like Toscana and Trentino-Alto Adige report modest activity, mainly focused on
333 Premiumization and Flavored Spirits. Smaller regions, such as Abruzzo, Basilicata, and Calabria,
334 show limited participation, often with a single firm per category. These findings highlight the
335 dominance of Northern regions in driving innovation and reveal growth opportunities for
336 underrepresented areas. These emerging trends are supported by strategic actions detected by the
337 analysis of management reports of the sampled firms' financial statements linked to:
338 *Heritage and Storytelling* - brands with strong narratives about heritage, craftsmanship, and regional
339 connection are appealing to consumers. This trend highlights spirits like single malt scotch, small-
340 batch bourbon, and aged rum, where storytelling is a key marketing tool.
341 *Personalization and Customization* - brands are offering personalized experiences, such as custom
342 blends, bespoke services, and interactive distillery visits. This trend caters to consumers seeking
343 exclusive, unique experiences.
344 *Cultural Influence and Celebrity Spirits* - celebrity-endorsed or owned spirits brands are gaining
345 popularity, especially in premium segments. Tequila and whiskey are frequently the focus of such

346 collaborations, which often result in limited-edition releases and targeted marketing campaigns
347 influenced by pop culture, music, and fashion.

348 **5. Discussion**

349 The results highlight significant disparities in regional digital readiness and dROA among Italian
350 spirits firms, suggesting that digitalization may operate as a strategic capability in an increasingly
351 competitive spirits market. Regions like Lombardia, Emilia-Romagna, and Veneto, with high rDESI
352 scores, demonstrate superior digital asset efficiency, driven by robust digital infrastructure,
353 widespread ICT adoption, and advanced digital skills. These investments enable firms to operate
354 efficiently, access broader markets, and meet evolving consumer demands. In contrast, Southern
355 regions such as Sicilia and Calabria show lower dROA values, reflecting challenges related to limited
356 digital infrastructure, skills gaps, and weaker adoption of digital technologies. These findings align
357 with prior research on the role of regional digital readiness in fostering competitive business
358 advantages [22,23,39].

359 The study also underscores the importance of individual rDESI dimensions in driving firm
360 performance. Connectivity emerged as the strongest predictor, reinforcing the critical role of
361 broadband access and infrastructure in enabling digital transformation. The study identifies
362 Connectivity as the most influential dimension of digitalization in driving financial performance in
363 the spirits industry, with a strong correlation to dROA ($R^2=0.65$, $\beta=1.48$). Beyond its technological
364 components (digital networks such as broadband, mobile, and satellite infrastructure) Connectivity
365 plays a foundational role in linking businesses, individuals, and markets, opening access to new
366 opportunities and enabling firms to thrive in a connected economy. Regions such as Lombardia,
367 Lazio, and Emilia-Romagna, which excel in Connectivity, demonstrate superior financial
368 performance. Robust networks in these regions facilitate seamless communication, efficient logistics,
369 and expanded market reach, supporting e-commerce operations, real-time customer engagement, and
370 innovative marketing strategies. At the same time, Connectivity fosters inclusivity, enabling firms in
371 underperforming regions, such as Calabria and Basilicata, to participate in the digital economy by
372 improving access to global markets and bridging regional disparities. Connectivity also underpins
373 innovation and digital sovereignty, providing secure and reliable infrastructure for deploying cutting-
374 edge technologies. Firms in the spirits sector leverage these networks to integrate tools like
375 blockchain for transparency, advanced analytics for optimization, and personalized marketing to cater
376 to evolving consumer demands. This result is consistent with previous studies that link connectivity
377 to improved efficiency, market reach, and innovation capacity [40,41]. Similarly, the Integration of
378 Digital Technologies as a critical driver of financial performance in the spirits sector, evidenced by

its significant correlation with dROA ($R^2=0.52$, $\beta=1.10$). Such correlation is strictly linked to the correlation results of Connectivity. In fact, a high correlation with Connectivity also implies a strong Integration of Digital Technologies, as the presence of advanced digital infrastructure enables firms to leverage the greater range of digital services available in the regions where such infrastructure exists. Additionally, this dimension reflects businesses' adoption of digital tools and e-commerce capabilities, enabling firms to optimize operations, enhance product quality, and expand market reach. Regions such as Emilia-Romagna, Toscana, and Friuli-Venezia Giulia, which excel in this dimension, consistently demonstrate superior dROA values, emphasizing the financial benefits of digital transformation. Firms that leverage these technologies can improve supply chain transparency, align with sustainability goals, and deliver tailored consumer experiences, meeting the growing demand for convenience, customization, and ethical practices. While Northern regions lead in this dimension, addressing regional disparities through targeted investments and policies could enable underperforming areas to catch up, fostering more inclusive growth. The moderate correlations observed for Human Capital and Use of Internet suggest that while these dimensions are important, their impact on financial outcomes depends on stronger alignment with firm-level strategies. Human Capital, which reflects both basic digital skills and advanced capabilities, provides the foundation for adopting and utilizing digital tools effectively. However, without direct integration into business operations, such as leveraging these skills for innovation or data-driven decision-making, their potential remains underutilized. Similarly, the Use of Internet Services dimension captures general online activities, such as communication, shopping, and banking, which, while indicative of digital engagement, may not directly translate into firm-level productivity or profitability without targeted strategies to capitalize on consumer behaviors. Thus, aligning these dimensions with business needs is crucial to maximizing their impact. The moderate correlations observed for Digital Public Services highlight their indirect yet important role in supporting business ecosystems. This dimension, which measures the extent of citizen interaction with public authorities online, reflects the accessibility and efficiency of regional digital infrastructure. In regions like Veneto and Emilia-Romagna, the availability of robust public e-services fosters an enabling environment for businesses by reducing bureaucratic barriers, streamlining administrative processes, and improving overall efficiency. While not directly tied to firm-level performance, these services create a supportive context that facilitates smoother operations and strengthens regional competitiveness. These findings, in line with RQ1, highlighted the strong correlation between digitalization (especially Connectivity and Integration of Digital Technologies) and firm performance, as reflected in the Average Weighted dROA. These quantitative findings are complemented by qualitative insights into emerging trends in the spirits sector, which reveal how firms are leveraging digital tools and infrastructure to respond to

shifting consumer preferences. The growing demand for Premiumization and Craft Spirits has spurred investments in artisanal and small-batch production, particularly in regions with strong heritage-based marketing strategies such as Toscana and Trentino-Alto Adige. Similarly, the rise of Health-Conscious and Wellness-Oriented Spirits has driven innovation in low-alcohol, non-alcoholic, and "clean-label" products. Firms in digitally advanced regions are better positioned to capitalize on this trend by using data analytics and digital channels to develop and market health-focused offerings. The increasing consumer emphasis on Sustainability and Ethical Practices has also influenced firm strategies. Many firms are adopting eco-friendly packaging, carbon-neutral production, and renewable energy practices, which resonate with environmentally conscious customers. Digital tools play a key role here, enabling transparency in sourcing, tracking supply chains, and communicating sustainability efforts to consumers. Other notable trends include the growth of Flavored and Experimental Spirits, such as exotic infusions and crossover flavors, and the expansion of the Ready-to-Drink (RTD) Cocktails segment, driven by consumer demand for convenience and portability. Firms in regions with higher digital adoption have leveraged ICT solutions to innovate in these areas, enhancing their ability to meet market demands. These emerging trends align closely with the study's quantitative findings. For example, regions with high Connectivity and Integration of Digital Technologies are better equipped to support innovative practices such as personalized marketing, direct-to-consumer sales, and streamlined logistics. Firms that operate in these regions, such as those in Lombardia and Emilia-Romagna, benefit from a synergistic relationship between digital maturity and their ability to capitalize on market trends.

6. Conclusions

This study has provided valuable insights into the critical role of regional digitalization in shaping the financial performance of firms in the spirits industry across Italian regions. By combining quantitative regression analysis with qualitative exploration of market trends, the research demonstrates how digital maturity not only is associated with firm-level digital asset efficiency but also enables businesses to adapt to an evolving and competitive market landscape. These findings hold significant implications for policymakers, business leaders, and researchers, offering a deeper understanding of the intersection between digital transformation and economic performance in a sector poised for continued growth and innovation.

In conclusion, this study suggests that regional digitalization levels, particularly Connectivity and Integration of Digital Technologies, are associated with firms' dROA and digital asset efficiency in the spirits sector. The integration of quantitative and qualitative findings highlights the importance of aligning digital transformation with emerging market trends to ensure long-term success. Addressing regional disparities in digital readiness and fostering innovation in response to consumer demands

will be critical for Italy to create a more inclusive and competitive economy, empowering firms across all regions to thrive in an increasingly dynamic global market.

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