"The impact of contracts on the relationships between business strategy, marketing-based technologies, industry 4.0 technologies and business performance for the craftsman industry"

Abstract

Purpose: This research aims to investigate whether the adoption of technology-based contracts for the maintenance of digital technologies and commercial contracts with clients and suppliers, as well as their combination, helps companies achieve superior outcomes and higher performance.

Design/methodology/approach: The authors test six main research hypotheses by using a data set of 762 firms. Data were collected through questionnaire from companies and along the craftsman industry, over a period between 2020 and 2022. The authors use structural equation modeling to estimate the relationships between business strategy, marketing-based and industry 4.0 technologies, and business performance by using selected indicators, to test the impact and the effects that technology-based contracts and commercial contracts have on the respective relationships.

Findings: The investigation shows that business strategy and technologies improve business performance. Moreover, marketing-based technologies act as a mediating factor between the impact that business performance has on industry 4.0 technologies. Overall, signing both contracts can somehow boost the value of crafts businesses, but firms should evaluate the most suited solution according to their needs. Results show that technologies-based contracts do not help in improving the relationships among the variables, except if in combination to commercial contracts, boosting the impact that 4.0 tech have on business performance. If willing to improve business strategy by leveraging on business performance, crafts firms are better off signing commercial contracts. Finally, the adoption of no contract is preferred when trying to enhance the impact that marketing-based technologies have on industry 4.0's.

Practical Implications: Investigating the interrelationship between these two types of contracts is useful to help craftsman companies understand how to develop their business model and achieve their strategic aims. Indeed, as a result of the analysis, firms will be given managerial insights on how to effectively enhance performance through contracts.

Originality/value: Although the relationships between the chosen indicators have been deeply investigated in the literature, as well as their positive association is clear, there still are some theoretical suggestions concerning the craftsman industry and how these relationships can be enhanced through the adoption and implementation of contract types. This lack of research continues to pose a crucial question for firms, which always look for strategies to strengthen their competitive advantage through digitalization and performance. Thus, the goal of this paper is to take one step toward filling this research gap.

Keywords: business strategy, marketing-based technologies, industry 4.0 technologies, business performance, contracts

Paper type: Peer Review

Introduction

Italian craft businesses play a significant role in the Italian landscape. Although the importance and economic significance of the craftsman sector has been recognized and studied in the literature of management, it has not been sufficiently explored.

Nationally, as Unioncamere (2021) states, "the Italian craft economy represents a historically rooted and still vital segment of the Made in Italy reputation" and in terms of businesses, it contributes to the 8% of Italy's GDP (Unioncamere 2021; Tortoriello and Antonelli 2017), driving the economic local development by attracting tourists, supporting related small businesses, and providing jobs (Grodach and Seman 2013; Jones 2020).

These companies' features are unique, as their distinguishing characteristics are a high skills specialization (Mintzberg, 1983), pride in high-quality work, significant autonomy (Collins et al, 2002), customization (Treacy et al., 1995), and small-scale production (Hayes et al., 1988).

In the most recent years, craftsman companies have been facing numerous challenges, being particularly impacted by the Covid 19 pandemic. Since these businesses are often family-owned and rely heavily on face-to-face interactions with customers and vendors, the pandemic has forced many to adapt to new modes of operation, including remote work and online sales, which not only had severe consequences on profits, revenues and cash flows, but also created a gap in the literature as to how these companies can remain competitive in the market.

In an ever-changing world, it is critical for any company to rise to the occasion (Iansiti et al., 2014; Sousa et al., 2018). Conducting a literature and background research, the authors realized there exists two main problems with respect to how these companies respond to change and react to both external and internal stimulus.

First, in terms of performance, craft enterprises in Italy tend to have smaller size, lower productivity and innovation, and more limited internationalization compared to other SMEs (Tortoriello and Antonelli 2017; Unioncamere 2021).

Secondly, while technology, when used properly, is an incredible enabler and door opener to new things (Iansiti et al., 2014; Sousa et al., 2018), this sector has demonstrated to be slow to adapt to technological tools. Datas show that only the 39% of Italian craft businesses used the internet for sales by 2020, compared to 56% of other SMEs (Unioncamere 2021).

Indeed, heavily relying on traditional production approaches and in-person shopping (Franch et al., 2020), craftsman enterprises face difficulty adapting to technologies trends such as e-commerce, IoT or automation. Given the evolving nature of this market sector, it is therefore essential to conduct further research to understand its underlying relationships between business strategy, technology, and performance (Porter, 1996).

With the aim to understand how the Covid 19 pandemic has been affecting craft businesses and the nature and weights of the impact that business strategy, technologies and business performance have for these companies, the relationships among them have been investigated. An additional step has been carried out, to understand whether these relationships can be boosted by the implementation of some contractual models.

Indeed, this research aim to provide the reader with a comprehensive conceptual model to explore the nature and weights of the impact that business strategy, technologies and business performance have for craftsman companies and to understand how the adoption of contract types can strengthen these associations, with the end purpose of providing crafts firms with managerial insights on how to leverage tech-based and commercial contracts as to boost the relationships among the variables.

In order to do so, we contacted, via phone and email, more than 2000 firms that specialize in crafts. 762 observations were collected from the questionnaire, with a 38% response rate.
Our survey focused on Italian crafts businesses from six different sectors (Table I), for which we only chose businesses whose primary focus is using manual labor techniques to produce (or repair) things.
Firms were randomly picked from the database and respondents were interviewed to determine what changed in their Business Model and technology usage patterns during the years 2020-2022, as a result of the Covid 19 epidemic.

Based on the literature review and accordingly to the gaps present in the literature, we developed some research hypotheses, and the appropriateness of our inner model is confirmed by a relative goodness-of-fit index of 0,937.
To achieve the objectives of this study and investigating on whether implementing certain contracts improves the ability of craftsman firms to succeed and gain on performance, we used partial least squares path modeling (PLS-PM) and the XL-Stat 2021.2.1 software. PLS-PM is a component-based estimate technique that predicts relationships between constructs and offers their scores on the original scale (Agyabeng-Mensah et al., 2020).

First in our analysis, we computed exploratory factor analysis (EFA) to determine the validity of the measures presented for the correlations. Performing the EFA, it emerged that the factor “technology”, initially intended to be explored as a unicum, needed to be distinguished in different components, focusing on technologies which are more marketing-oriented and on technologies proper of industry 4.0.
To assess the validity and compliance with the theorized conceptual model of the factors derived from the EFA procedure, we performed CFA in support for convergent validity and constructs’ reliability, which delivered a Cronbach’s alpha > 0,7 (Hair et al., 2009).
In addition, we evaluated the convergent validity by analyzing the outer loadings and using the average variance extracted (AVE) criterion. Finally, to estimate the conceptual model and investigate the direct and

indirect effects among the variables, the partial least squares path modeling method was employed and H1–H6 are tested using XL-Stat.

To address our research questions about the role of tech-based and commercial contracts on the relationship between BS, MB tech, 4.0 tech and BP, a multi-group analysis for the structural model's path coefficients was used. The direct and indirect effects of the factors are displayed at Table V and Table VI, respectively before and after including the impact of contracts in our analysis.

This approach allowed the authors to understand how business strategy, marketing-based technologies, industry 4.0 technologies and business performance interact for the craftsman sector, and which contractual models are better suited to boost the impact of each, based its impact on performance, and also considering the integration they have with suppliers for the signing of commercial contracts for digital technologies.

To conclude, this research does not only aim to contribute to the current state of the literature, but also assists managers and practitioners in better understanding how a change in contracts impacts on the relationships among the hypothesis H1-H6, providing valuable insights for craftsmen businesses seeking to navigate the dynamic market and gain a competitive advantage (Sousa et al., 2018).

Theoretical Background and Hypothesis Development

The relationship between business strategy, business performance and technology is an important topic of research, as firms increasingly adopt digital technologies to improve their strategic positioning and performance.

First of all, in order to conduct the research, it is appropriate to devote two lines to each one of the topics we are about to explore, as to adopt the definition which better reflects the connotation we want to give to each concept within our investigation.

In this paper, business strategy is defined as the set of decisions and actions that a company undertakes to achieve its daily goals and objectives. It involves managing resources, coordinating activities, and optimizing processes to ensure that the company operates efficiently and effectively. Effective strategy requires thorough planning, execution, and continuous improvement (Ittner & Larcker, 1998).
It is a critical component of a company's success, particularly for the craftsman sector, where products are often handmade and require specialized skills, equipment, and materials. According to Hayes and Wheelwright (1984), it involves the alignment of a company's resources and capabilities to create a competitive advantage. In the craftsman sector, this is declined in the development of processes and procedures that optimize the use of resources to maximize efficiency and productivity while maintaining the quality of the products.

The term “technology” refers to the use of digital technologies to transform business processes, operations, and products or services (Westerman et al., 2011). Technology has become an essential tool for craftsmen in the modern market; its use has allowed artisans to scale their businesses, streamline their operations and reach a wider audience. The latest technological trends in the craftsman market sector, such as omnichannel, offer even more opportunities for craftsmen to innovate and succeed in the industry. In some way, digitalization is a process of innovation that involves the integration of digital technologies into all aspects of a business, from its products to customers’ interactions (Van der Pijl and Van Deursen, 2017).

In our research, the authors differentiate between technologies which are more marketing oriented, namely marketing-based technologies, and emerging technologies proper of the Fourth Industrial Revolution, “industry 4.0 technologies”, analyzing them separately.

Ultimately, there have been numerous attempts in the literature to give a universal definition to the concept of performance, by elucidating its implications and trying to measure its impact. The notion refers to the degree to which an individual, organization or system achieves its goals, as measured by various criteria such as efficiency, effectiveness and productivity (Niven, 2005). According to Neely, Gregory, and Platts (2005), this is a multidimensional concept that can be evaluated from different perspectives, including financial, customer, internal, and innovation.

In the context of craftsman businesses, performance refers to the ability of these businesses to effectively and efficiently execute their operations in order to achieve their goals and objectives. As noted by Kowalkowski and Kindström (2019), business performance is a key determinant of a company's success, particularly in the service sector where customer satisfaction is critical. In fact, in the craftsman industry, it can impact the quality of the products or services provided, the customer satisfaction, and ultimately, the business's reputation and financial performance.

By developing some hypotheses, we seek to test them in the new era of the craftsman sector from a few years now, following the disruptions brought by the pandemic to this market, by devolving some hypotheses to drive our research and quantitatively test them.

After having conducted a careful literary review, we expose our main findings below.

Business strategy on business performance

In today's competitive market environment, it is demonstrated that a company’s strategy plays a critical role in driving business success for each industry. Indeed, craftsman businesses face unique challenges that require a tailored business strategy.

For instance, they often rely on a small number of skilled workers who are responsible for creating products from start to finish. This means that the production process is often slower than in other industries, and the capacity for scaling up production is limited. Therefore, strategy in the craftsman sector must focus on

optimizing the use of resources to maximize efficiency and productivity while maintaining the quality of the products, by helping craftsman businesses improve their performance, increase productivity, and enhance customer satisfaction.

According to a study by Karim and Hussain (2018), among the most significant benefits of implementing an effective business strategy there is that companies with a well-designed business strategy are better able to manage their resources and reduce waste, therefore increasing their productivity.
For instance, the furniture manufacturer BenchMade Modern, an American sofas manufacturer company, has implemented a customer-focused strategy that has helped the company achieve significant growth. BenchMade Modern's strategy focuses on providing customers with high-quality, customizable furniture that is made to order. As a result, BenchMade Modern has been able to differentiate itself from its competitors and build a loyal customer base (Kesavan, 2018).

Similarly, the eyewear company Warby Parker has implemented strategic choices that focus on vertical integration and supply chain efficiency. By controlling its supply chain, Warby Parker has been able to offer high-quality, stylish eyewear at a lower cost than its competitors. This has helped the company achieve significant growth and establish itself as a leader in the eyewear market (Singer, 2013).
Indeed, the impact of business strategy on business performance in the craftsman industry is significant, as the right strategies can help businesses streamline processes, reduce costs, and improve customer satisfaction.
However, the literature lack of consensus on the most effective business strategies for the craftsman industry. While some studies have identified specific strategies that can improve performance, such as the use of technology and data analytics, there is no one-size-fits-all solution. The effectiveness of different business strategies may vary depending on the specific context of the business, including factors such as size, location, and customer base.
The use of technology, employee training, development (R&D) and effective supply chain management are all important aspects of strategy that can impact the final performance, ensuring that the supply chain is efficient and effective to help businesses reduce costs and improve service delivery (Kowalkowski et. al., 2019).

Business strategy on marketing-based technologies and industry 4.0 technologies

Digitalizing is indeed a way to drive strategy, although, together with entrepreneurs, craftsman companies, which includes small-scale artisanal manufacturers and skilled tradespeople, tend to be among the categories willing the least to invest in digital technologies. The reason mainly relies on the fact that their market is typically used to be very close, which results in not feeling the urgency to invest in technologies to enable the further reach of a multitude of places around the globe.
However, there is no doubt about the high priority need for companies to evolve in the face of ever new market and consumer needs. Particularly, since Covid 19, which made their territorial market inaccessible,

and hand in hand with the acceleration of the digitalization, companies have had to shift to online sales and marketing, as well as adopt digital tools for communication and collaboration with customers and suppliers (Bain & Company, 2021).
The benefits that craftsman businesses can achieve by implementing a strategy that supports digitalization are significant, like improved access to new markets and reach of new customers to compete with larger companies (European Commission, 2018).

The idea that a clear and well-defined business strategy can help firms in any industry make better use of digital tools and technologies to achieve their goals is generally accepted. A study by McKinsey & Company on digital transformation found that "companies with well-defined strategies for digital transformation are more likely to reap the benefits of digitalization than companies without a clear plan" (Bughin, Seong and Manyika, 2019).

However, it is important to note that the correlation does not necessarily imply a causal relationship and that there may be other factors that influence company performance. Indeed, the process of digital transformation may not come very smoothly, carrying with it some difficulties that companies have to overcome (Bughin *et al.*,2018), including issues of leadership, corporate culture and competencies. For companies to emphasize the competitive advantage they can gain from technologies, they need to be conscious of how to make the most out of them (Brynjolfsson and McAfee, 2014).

Among the supporters of the thesis according to which the relationship between business strategy and technologies implementation has to be considered as positive, Marco Iansiti and Karim R. Lakhani in their article from a Harvard Business Review state: "*Companies that are winning in the digital era are doing more than just adopting technology; they are building their strategies around it. Digital strategy is not just about the technology; it's about how technology can enable a clear business strategy*."

With respect to marketing-based and industry 4.0 technologies, both appear to be closely intertwined to business strategy, which determine the best suited approaches to achieve predetermined goals.
Leveraging on strategy to boost marketing technologies enables companies focusing on a niche market of high-end and premium customers to benefit from personalized marketing technologies like customized email newsletters, targeted search, and social media ads directed at specific demographic groups (McDowell, 2016; Peppers & Rogers, 2016). Similarly, craft businesses appealing to a wider audience may find more traditional, mass-market technologies more appropriate, such as print advertising in magazines, billboards, television, and radio (Kotler & Keller, 2016). On this matter, Wedel & Kamakura (2012) identify in an integrated multi-channel marketing strategy the most effective approach for craft businesses, combining both personalized and mass-market technologies.

Marketing-based technologies and industry 4.0 technologies on business performance

Several studies have found a positive correlation between marketing-based technologies and key performance metrics like growth in sales, conversion rates, customer acquisition and customer lifetime value. A 2019 survey of 730 marketing executives found that companies that use 4 or more marketing technologies outperform those using 1 to 3 technologies across various performance measures like ROI, sales growth, demand generation and lead qualification (Franklin et al. 2019).

For what concerns industry 4.0 tech, a well-planned integration of technologies into the business strategy can lead to greater competitiveness, efficiency and growth. Indeed, to be able to compete with mass customization, actors such as 3D printing (Modi et al., 2021), process optimization (Wang et al., 2019), cost reduction (Kamble et al., 2019) and skill enhancement (Wang et al., 2019) can be key.
However, to gain the benefits of industry 4.0, craftsman companies' business plan must make a systematic use of these tools (Modi et al., 2021) and craft businesses need to identify how specific technologies align with and enhance their strategic value propositions, operational processes, goals and business models.

Marketing-based technologies on industry 4.0 technologies

Once investigated the nature of the relationship linking strategy to marketing-based and 4.0 technologies, it is opportune to focus on whether it exists a solid link between the two. The literature suggests that the impact marketing tech has on industry 4.0 is significant, as marketing technologies enable craft businesses to better leverage advanced industry 4.0 capabilities (Peppers & Rogers, 2016).
By integrating them, craft businesses can reduce costs by optimizing production and supply chain management, increase sales by using data-driven insights, offering an interactive and personalized customer experience across both physical and digital channels (Wedel & Kamakura, 2012), and increase operations scalability, being able to reach a wider audience and compete with larger manufacturers (Kotler & Keller, 2016).
However, this integration, while potentially transformational, does present challenges, such as cybersecurity and privacy, as well as organizational resistance to technology-driven change (Kotler & Keller, 2016; McDowell, 2016).

Research hypothesis development and research gaps

From the literature review conducted by the authors, it emerged that the nature of the relationships among strategy, marketing-based and industry 4.0 technologies, and business performance are mainly considered as positive, despite some minimal dissenting opinions.

By developing some hypotheses, we seek to test them in the new era of the craftsman sector from a few years now, following the disruptions brought by the pandemic to this market, by developing some hypotheses to drive our research and quantitatively test them.

H1. Business strategy has a positive impact on marketing-based technologies
H2. Business strategy has a positive impact on industry 4.0 technologies
H3. Marketing-based technologies have a positive impact on industry 4.0 technologies
H4. Business strategy has a positive impact on business performance
H5: Marketing-based technologies have a positive impact on business performance
H6: Industry 4.0 technologies have a positive impact on business performance

Conducting the literary review, it also emerged the existence of relevant gaps in the literature with respect to these topics, that we aim to fill with our analysis.

First of all, the main gap is the lack of studies that focus specifically on the craftsman industry. Secondly, craftsman companies have been particularly impacted by the Covid 19 pandemic, leaving a gap in the literature regarding how these changes are affecting the long-term sustainability of these businesses and the impact among the abovementioned relationships.
With respect to marketing-based strategies, the evidence results to be still largely anecdotal. Further research is required also for 4.0 technologies, to understand how craft SMEs may use them to their advantage. More case-based and empirical studies in this area could aid in the identification of best practices and hazards to assist other craft firms in their digital transformation (Pisano et al., 2009; Luthra & Mangla, 2018; Moeuf et al., 2020). Indeed, there is only few research in the literature on how craft firms may leverage on marketing technology to implement 4.0 tech more research is needed to understand how these tools might be used in craft SMEs with limited resources and customizing skills (Kotler, P. et al., 2021; To, W.M. et al., 2021; Moeuf, A. et al., 2020).
Furthermore, while contracts play a vital role in various industries, it does not appear to us that their relevance with respects to the craftsman has been tackled in literature.

To contribute to the knowledge base and help craftsmen businesses thrive in the digital era, we aim to feel this research gap by investigating on whether the adoption of technology-based contracts for the maintenance of digital technologies and commercial contracts for technologies with clients and suppliers, as well as their combination, helps companies to achieve superior outcomes and performance.
This statement paves the way for the second goal of our research, to test whether the signs and magnitudes of the previous hypotheses (H1–H6) change according to implementation or change of contracts that craft firms undertake.
Contracts play an essential role in regulating the purchase and maintenance of adopted digital technologies, as well as in the relationships between craftsman companies, suppliers of goods and services and their customers.

In this analysis**,** tech-based contracts are intended as internal contracts for digital maintenance, meaning those contracts used by companies for the regulation and the maintenance service of technology.

These contracts refer to agreements made between a company and a service provider for both maintenance and support of the company's existing digital tools (Laudon and Laudon, 2016; Oz, 2018; Turban et al., 2019), such as software applications, databases, and IT infrastructure. They are designed to ensure the availability and reliability of IT systems, as well as prevent downtime and data loss. Maintenance contracts typically specify the services to be provided and the service levels to be achieved, as well as the fees to be paid and eventual penalties for non-compliance.

The literature suggests that contracting maintenance services for digital tools is important for companies that own such tools (Lee et al., 2015), providing an analysis of the types of clauses and motivations for their use (Lueg, 2015). Similarly, Fosstenløkken and Schiefloe (2017) emphasize the need for clear and specific service-level agreements in this type of contract, as well as effective monitoring and enforcement mechanisms.
Adopting digital technologies can significantly impact a company's business strategy, as it often requires a shift in focus toward innovation and digital transformation. Tech based contracts help to clarify the terms and responsibilities of all parties involved, ensuring that the adopted technologies align with the company's strategic objectives (Bharadwaj et al., 2013; Porter & Heppelmann, 2014). Moreover, since our hypothesis that digital technologies can improve business performance by enhancing efficiency, productivity, and competitiveness, well-structured contracts may contribute to realizing these benefits by setting performance metrics, service level agreements, and other provisions that help in maximizing the return on investment (Chen et al., 2019; Mithas et al., 2011).

Contracts for digital technologies also encompass marketing technologies, such as customer relationship management (CRM) systems, marketing automation platforms, and e-commerce solutions. In literature, these contracts help to define the scope, data privacy, and security requirements, ensuring their contribution to the company's overall marketing strategy (Li & Kannan, 2014; Lamberton & Stephen, 2016).
In the context of craftsman companies, industry 4.0 technologies, such as the Internet of Things (IoT), robotics, and additive manufacturing, can revolutionize production processes and supply chain management. Contracts for these technologies help to establish the framework for their successful integration and adoption, addressing intellectual property, data ownership, and other critical issues (Lasi et al., 2014; Lu, 2017).

Commercial contracts with customers and suppliers are considered vital for defining the terms of trade and fostering long-term relationships that support a company's business strategy. These contracts can help to ensure that a company's value proposition is effectively communicated and delivered to its target market (Anderson & Narus, 1990; Gadde & Snehota, 2000).
Well-structured contracts with customers and suppliers are proved to also impact a company's financial and operational performance by influencing factors such as pricing, payment terms, and delivery schedules. In addition, contracts can help to manage risks, such as supply disruptions and customer complaints that could negatively impact a company's performance (Cousins et al., 2006; Jap & Ganesan, 2000).

Although commercial contracts with customers and suppliers may not directly relate to marketing technologies, they can influence the effectiveness of a company's marketing strategy by establishing the framework for collaboration and co-creation of value. This, in turn, can affect the adoption and success of these technologies (Vargo & Lusch, 2004; Grover & Malhotra, 2003). Furthermore, they play a role in both facilitating the adoption of industry 4.0 tech, by addressing concerns related to data sharing, interconnectivity, standardization and risk management, contributing to a smoother transition towards Industry 4.0 (Kagermann et al., 2013; Stock & Seliger, 2016).

With the above arguments and prior empirical evidence, we argue that the relationships underlying H1–H6 can be strengthened through the adoption of tech-based and commercial contracts.
To investigate how the introduction or change in contracts has an impact on the abovementioned hypothesis, we aim to quantify their impact by classifying in groups (Figure I), as follows:

GROUP 1 Both contracts change or are implemented	GROUP 2 Only commercial contracts are implemented
GROUP 3 Only tech-based contracts are implemented	GROUP 4 No contract changes or is implemented

Figure I. Group matrix

These four groups will be later used in order to see, for each of those relationships and hypothesis (H1-H6), if one combination, for instance Group 1 (which is the one group that changes a lot in terms of supply chain relationships and contracts for digital technologies), somehow performs better than a different group, e.g., Group 4, whose contracts does not seem to be very reactive to change.

Therefore, we test the differences in our research hypotheses against these groups to provide some managerial prescriptions and insights on the considered variables for each hypothesis. We expect to identify the effects of changes in the combination of contracts on the six relationships, and the best contractual mechanisms (whose results are displayed in Table VI).

By understanding how the two types of contracts impact the foregoing conceptual model, we built a comprehensive conceptual model to help us in visualizing the data context and the links detected through the hypothesis formulation (Figure II).

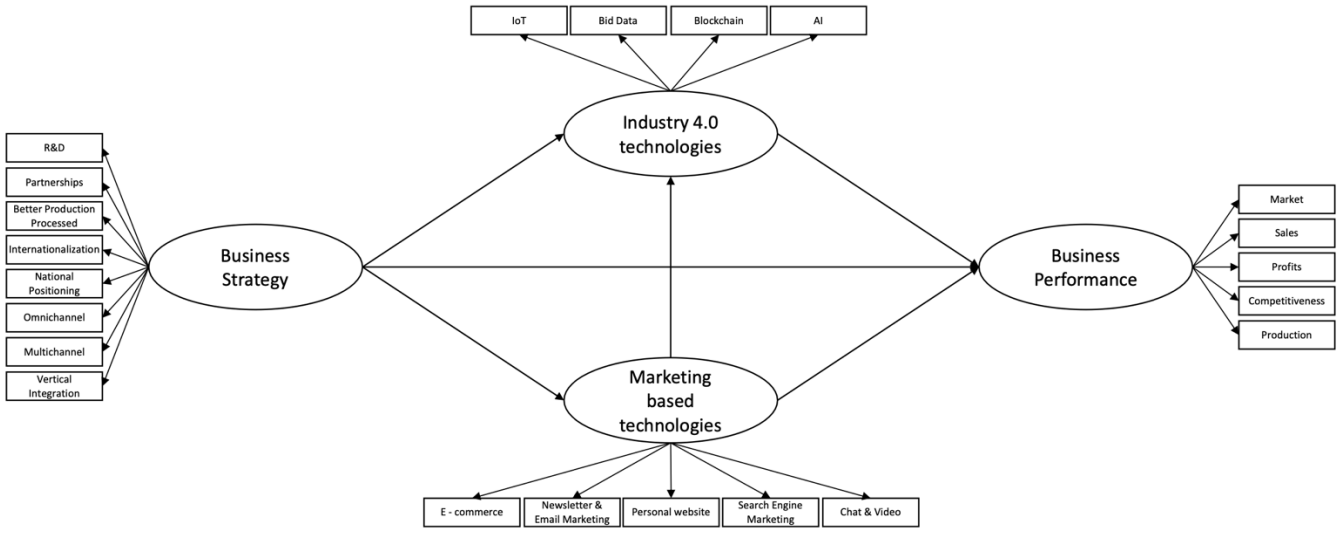

Figure II. Conceptual Model

Methodology

Sampling

Our survey included Italian crafts businesses (see table 1) from six different sectors, namely: *(1) Ceramics, Marble and Stone Carvers, (2) Craft Design accessories & Glass Decorations, (3) Jewelry, Goldsmiths & Ironsmiths, (4) Restorers, (5) Textile, Leather & Fashion, (6) Wood Workers.*

To be more specific, we only chose businesses whose primary focus is using manual labor techniques to produce (or repair) things. The poll was developed and pretested with input from academics and important opinion leaders in the industry to improve its usability and clarity.

So, using a 1–7 Likert scale, our questionnaire posed questions about business decisions taken in the two years following and during the Covid-19 pandemic period. We chose Italy as our research's focal point because Italian craft businesses continue to play a significant role in the local economy (CGIA[1], 2020). Our data came from two important industry websites, *Fondazione Cologni*[2] and *Mad'in Europe*[3], which together represent more than 1500 Italian handmade enterprises.

The questionnaire was designed in Italian and 2000 firms that specialize in crafts were contacted via phone and email. In the end, we collected 762 observations with a 38% response rate. We opted not to add any quotas for industry sectors, therefore firms were randomly picked from the database and respondents were interviewed to determine what changed in their business model and technology usage patterns in the years 2020-2022, as a result of the Covid 19 epidemic. The craft firms that took part in the survey are shown in the table below.

[1] Italian Craftsmanship Research Center, https://www.cgiamestre.com/
[2] https://fondazionecologni.it/it
[3] https://madineurope.eu/en/home/

Factors	Frequency	Percentage
Age of the Business Owners		
16-25 years	26	3%
26-35 years	139	18%
36-45 years	173	23%
46-56 years	249	33%
+57 years	175	23%
Firm Size		
0-1 employees	484	63 %
2-5 employees	170	22 %
6-10 employees	65	9 %
+10 employees	43	6 %
Sales Revenue (Euro)		
0-20k	244	32 %
21k-120k	287	38%
121k-250k	78	10%
251k-650k	66	9%
+651k	87	11%
Industry		
Ceramics, Marble and Stone Carvers	93	12%
Craft Design accessories & Decorating	294	39%
Jewelry, Goldsmiths & Ironsmiths	122	16%
Restorers	27	4%
Textile, Leather & Fashion	156	20%
Wood Workers	70	9%
Geographical Market/Area		
Local	57	7%
Provincial	48	6%
Regional	78	10%
National	227	30%
International	352	47%
Total		100%

Table I. Description of the sample composition

Estimation methods

To achieve the objectives of this study, we used partial least squares path modeling (PLS-PM) and the XL-Stat 2021.2.1 software. PLS-PM is a component-based estimate technique that predicts relationships between constructs and offers their scores on the original scale (Agyabeng-Mensah et al., 2020). Furthermore, PLS-PM delivers less biased results than alternative techniques to structural equation modeling with sample sizes less than 200 observations, while obtaining the same power with sample sizes greater than 200 observations (Chin, 2010). Finally, PLS-PM does not require any distributional assumption for the data (in contrast with a maximum likelihood covariance-based approach).

Model assessment

The business strategy (BS) construct encloses the items depicting the corporate strategy of craftsman companies. These include R&D, partnerships, improvement of production processes, horizontal integration (international market development), the strengthening of national positioning (national market development), omnichannel strategies, multichannel strategies and vertical integration. From the analysis, it emerged that technologies, first considered as a unicum, needed to be distinguished in different components, meaning

technologies which are more marketing-oriented and technologies which are proper of the Fourth Industrial Revolution. Respectively to digital-marketing technologies, it emerged that the factor is comprehensive of e-commerce, newsletters and email marketing, personal website, search engine marketing and chat and video, while industry 4.0 technologies include Internet of Things (IoT), big data, blockchain, artificial intelligence (AI) and blockchain. Finally, regarding the construct Business Performance (BP), we include items pertaining to the market potential, sales and profits, production efficiency and competitive advantage. Some components, initially taken into account within our questionnaire and database, had to be removed from the investigation, since not belonging to the construct considered.

Hypothesis testing and results

This section provides the empirical results of the hypothesis testing by considering the entire sample; hence, none of the groups illustrated in Figure I is considered in this part of the analysis. The general outcomes of our inner model show a relative goodness-of-fit index of 0,937.

We use exploratory factor analysis (EFA) to determine the validity of the measures presented for the correlations. To perform it, we employ the principal components extraction method, and the resulting components are those with eigenvalues greater than 1.
EFA is commonly used for scale development and scale homogeneity testing (Gotschol et al., 2014). Its objectives are to compile complex patterns of correlations between variables into an explanatory structure, discover the quantity and nature of the underlying latent variables and define their preliminary relationship with the measured variables. The Bartlett's test of sphericity is extremely significant ($p<0.001$), hence we conclude that the approach is valid.

The results, displayed in Table II, indicate the component loadings (λ) of the components after rotation. Weights are considered statistically significant at a p-value $\leqslant 0.001$. The exploratory factor analysis reveals on content validity and reliability.
The resulting values, according to Colicev et al. (2016), can be retained because all components meet the requirements. Since to belong to a certain construct each item should have a higher loading than the loadings associated to the other constructs, social media, quality and 3D printing resulted not to be reliable and have been removed from the model, hence were not considered in our investigation, due to their pertinence to more than one factor. The final items' list allows for the detection of the cross-loadings associated with each construct.

	Business Strategy (BS)	Industry 4.0 technologies (4.0)	Marketing-based technologies (MB)	Business Performance (BP)
R&D	0,739			
Partneership	0,775			
Better production processes	0,758			
International market development	0,677			
National market development	0,744			
Omnichannel	0,732			
Multichannel	0,813			
Vertical integration	0,797			
IoT		0,817		
Big data		0,752		
Blockchain		0,728		
AI		0,739		
E-commerce			0,644	
Newsletters & Email Marketing			0,709	
Personal Website			0,739	
Search Engine Marketing			0,762	
Market potential				0,866
Sales				0,900
Profits				0,903
Competitive advantage				0,854

TABLE II. EFA rotated component matrix (*summary of the cross-loadings)*

After extracting the components, confirmatory factor analysis (CFA) has been computed for scale assessment (Table III). CFA is performed to assess the validity and compliance with the theorized conceptual model of the factors derived from the exploratory factor analysis procedure.

All the standardized factor loadings in the model are higher than 0.5 and, therefore, statistically significant, supporting convergent validity. When the measurement model is tau-equivalent, construct reliability (CR) is equivalent to Cronbach's alpha. Hair et al., (2009) noted that CR values of 0.7 or higher denote good reliability. This means that the total error variance should consist of less than 30% of the variance of the latent variable. Consistently with Table II and Table III, our analysis can be confirmed as valid and reliable (CR $\geq$ 0,7).

Factors	Manifest variables	Standardized loadings
Business Strategy	R&D	0,739
	Partneership	0,775
	Better production processes	0,758
	International market development	0,677
	National market development	0,744
	Omnichannel	0,732
	Multichannel	0,813
	Vertical integration	0,797
Industry 4.0 technologies (4.0)	IoT	0,817
	Big data	0,752
	Blockchain	0,728

	AI	0,739
Marketing-based technologies (MB)	E-commerce	0,644
	Newsletters & Email Marketing	0,709
	Personal Website	0,739
	Search Engine Marketing	0,762
	Chat and Video	0,564
Business Performance (BP)	Market potential	0,866
	Sales	0,9
	Profits	0,903
	Competitive advantage	0,854
	Production efficiency	0,672

TABLE III: CFA results

In addition, we evaluate the convergent validity by analyzing the outer loadings and using the average variance extracted (AVE) criterion. As displayed in Table IV, our results show that the AVE for each construct takes values near to the proposed threshold of 0.5 (Chin, 2010). For the factor marketing-based tech, the AVE value of 0.472 still supports the convergent validity of the construct, because the MB tech factor has a construct reliability factor above 0.6 (i.e. 0.767).

Our model fits the required conditions, as evidenced by the trends depicted in Tables II and III. Being that AVE is viewed as a discriminant validity criterion, we attain overall acceptable levels of internal consistency, convergent validity, and discriminant validity. As a result, the structural model can be studied further.

Factors	Number of variables	AVE	Cronbach's alpha
BS	8	0,57	0,892
MB	5	0,472	0,717
4.0	4	0,577	0,764
BP	5	0,712	0,895

Table IV. Model composite reliability

Hypothesis testing of the sample

To estimate the conceptual model and investigate the direct and indirect effects among the variables, the partial least squares path modeling method is employed and H1–H6 are tested using XL-Stat. Table V displays direct and indirect effects of the factors.

For what concerns the direct effects, H1 is supported (coef. 0,368 and p-value < 0.01), highlighting that the BS is an effective tool to successfully manage and increase marketing-based technologies (McDowell, 2016). Similarly, BS is confirmed to enhance industry 4.0 tech, as H2 yields positive and significant value (p-value < 0.01). This result is coherent with our literature review, in support of the thesis that a well-defined

business strategy generates an increase of new technological tools and of their efficacy of use. H3 is also strongly supported (p-value < 0.01), bringing evidence on the fact that investments in marketing technologies are highly advantageous in achieving a company's more effective industry 4.0 transformation (Peppers & Rogers, 2016).

When it comes to the analysis of business performance, H4 and H5 are well supported and their statistical significance is confirmed with a p-value < 0.01, demonstrating that an effective business strategy is recognized to significantly influence performance outcomes for craftsman firms (Jones and Pujari, 2019) and that firms can effectively use a marketing business strategy to increase their business performance (Jones and Pujari, 2019). Finally, H6 also finds support, with a significant threshold near to the 100%, indicating that 4.0 technologies alone keep being a fruitful practice to increase firms' business performance.

To sum up, all the hypotheses of the direct effects are supported with a significance threshold of 100%, therefore none of them is rejected.

Table V also displays the indirect effects among the relationships, computed by analyzing the path coefficients and standard deviations of the constructs. In the model, the computed path coefficients quantify the relative strength and sign of the effect from a causative variable to an endogenous or outcome variable. When the model contains more than one causal variable, the standardized path coefficients reflect partial regression coefficients that evaluate the effect of one variable on another, while correcting for preceding factors. Indirect effects can be interpreted as "conditioned" or "delayed" causal effects (Colicev et al., 2016). Performing a t-test, we consider as significant the values higher than 2.

For most of the results, we do not find support for the influence of indirect effects, due to not statistically significant path coefficients. However, empirical research has highlighted the indirect causal relationships existing among business strategy and industry 4.0 technologies constructs (H2), with a t-test > 2. This value is particularly relevant in its magnitude, as marketing-based technologies introduce a mediating pathway on the statistical relationship between the independent (BS) and the dependent (4.0 tech) variable. The value of 7,608 tells that marketing-based technologies play a role in facilitating the adoption and the use of advanced technologies. We therefore deduct that marketing technologies partially causes the positive relationship explored in H2 and, boosting MB tech through the independent variable, is likely to positively influence the effects of 4.0 technologies.

In other words, an increase in marketing-based technologies is associated with an increase in industry 4.0 technologies, since, in the causal relationship considered, MB tech has an indirect effect on the dependent variable of BS. However, being H2 significant even in its direct effects, the statistical relationship persists between the two constructs even when the mediator (MB) is taken out of a model.

Direct effects				
Factors	BS	MB	4.0	BP
BS				
MB	0,607***			
4.0	0,195***	0,551***		
BP	0,453***	0,117***	0,140***	

Notes: *p < 0.1; **p < 0.05; ***p < 0.01

Indirect effects				
Factors	BS	MB	4.0	BP
BS				
MB	0			
4.0	0,334*	0		
BP	0,145	0,077	0	

Notes: for the direct effects, *p < 0.1; **p < 0.05; ***p < 0.01
Notes: for the indirect effects, *t-test > 2

Table V. Direct and indirect effects in support of H1–H6

Hypothesis testing on contracts

A multi-group analysis for the structural model's path coefficients has been used to address our research questions about the role of tech-based and commercial contracts on the relationship between BS, MB tech, 4.0 tech and BP. The t-test in XL-Stat has served as a tool to compare the path coefficients of the groups and determine the significancy level of their difference. This methodology has been widely used in recent studies (De Giovanni and Esposito Vinzi, 2014a, b), as it demonstrates how structural routes differ between groups.

The results of the analysis are displayed in Table VI, distinguishing between firms adopting both contracts and those adopting only one contract type or no contracts, following the matrix reported at Figure 1.

The first comparison differentiates among whether both contracts or only commercial contracts are signed. Relatively to H1, it appears that the difference between these two groups is very low. Since it is very low, it comes with a p-value which is high for the impact that business strategy has on marketing-based technologies. Therefore, we deduct that these two groups are not very different in the analysis of BS to MB tech and our hypothesis is not confirmed. The multigroup analysis delivers similar results for H1, H3 and H5, whose p-values in relation to comparison 1 are > 0.1 and, therefore, the significant threshold is lower than the 10%.

With respect to H4 and H6, the difference in whether implementing both contracts or only commercial contract is statistically relevant.
Respectively, the robustness of our hypotheses is verified with a p-value < 0.1 for H4 and <0.5 for H6.

Specifically, for the relationship between BS and BP (H4), we can deduct that companies signing only commercial contracts are better off with respect to companies signing both contracts, result pointed out by the negative value (-0.227). For what concerns H6, the result of the impact on the relationship is positive and the value is equal to 0.221. This means that for companies willing to improve their BP through industry 4.0 technologies, it is recommended to sign both contracts, instead of signing only commercial contracts. In this case, the significancy we get from the empirical analysis is stronger and the p-value shows that what assumed in our hypothesis development is statistically robust. Indeed, this result is consistent with the fact that tech-based contracts are the contract types typically employed for the service and maintenance of digital technologies and, therefore, commercial contracts are not enough to boost this relationship.

Comparison 2 compares the signing of both contracts with respect to no contract at all or no contract change. As shown in Table VI, H1, H2, H4 and H5 show non-significant results. Differently, we can observe that H3, exploring the impact that MB tech have over industry 4.0 tech is significant (p-value<0.05). In this case, crafts companies where there is no contract change are better off than companies signing both contracts for the impact that marketing-based technologies have on industry 4.0's (-0.168).

In contrast, the results display that signing both contracts is recommended with respect to no contract change (0.198), in case companies are willing to increase their BP by leveraging on industry 4.0 technologies. Therefore, the difference in implementing both or no contract is considered significant, although with a significance threshold of 10%, highlighting that the use of digital technologies can induce a positive impact on business performance; even though, due to low robustness, this result must be carefully examined on a case-by-case basis.

For comparison 3, where both contracts are compared to tech-based contracts, the only significant relation, corresponding to a p-value < 0.1, regards H6, on the impact that technologies 4.0 have on BP. The analysis shows a result of 0.238, meaning that also in this case signing both contracts is helpful when the purpose is of increasing business performance through investments on new and more reactive technologies. In this case, companies signing both contracts are better off with respect to companies signing only tech-based contracts. This result is consistent with comparison 2 and 3's.

It is interesting to notice that comparisons 4 (commercial contracts vs no contract change), 5 (commercial contracts vs tech-based contracts) and 6 (no contract change vs tech-based contracts) do not widely differ among each other and none of the hypotheses appear to be significant.

Finally, we find support for a significant indirect effect of BS on industry 4.0 technologies in case commercial contracts (3,359), no contract change (5,06) and tech-based contracts (2,654) are implemented. In contrast, this aspect is not statistically supported for group 1.

Hypotheses	Both vs Commercial	Both vs no change	Both vs tech-based	Commercial vs no change	Commercial vs tech-based	No change vs tech-based
(H1) BS - MB	*0,052*	*0,033*	*0,020*	*0,085*	*0,073*	*0,012*
(H2) BS - 4.0	*0,185*	*0,107*	*0,094*	*0,077*	*0,091*	*0,014*
(H3) MB - 4.0	*0,140*	0,168**	*0,054*	*0,028*	*0,087*	*0,114*
(H4) BS - BP	0.227*	*0,076*	*0,078*	*0,151*	*0,149*	*0,002*
(H5) MB - BP	*0,090*	*0,129*	*0,177*	*0,038*	*0,087*	*0,049*
(H6) 4.0 - BP	0.221**	0,198*	0,238*	*0,023*	*0,017*	*0,040*

Notes: *p < 0.1; **p < 0.05; ***p < 0.01 *Italic values are are not significant*

Table VI. Difference in the structural paths between groups adopting or non-adopting a certain type of contract

Discussion of the findings and contributions

Discussion of the findings on BP, MB tech, 4.0 tech and BP

Interestingly, the impact of both MB and 4.0 technologies on BP is higher than the overall impact business strategy has on BP. Thus, the results of this study offer a genuine contribution to craftsmen by suggesting the implementation of technology systems that are composed of both marketing and more advanced technological tool, as this would result in higher levels of performance.

Therefore, the first insight is that, when firms are willing to increase their sales and profits, acquire a higher market potential, improve their production efficiency and gain a superior competitive advantage, they can rely on the implementation of a conjunct of technologies, both oriented to retain or acquire new customers and to strengthen their technological positioning through the employment of emerging technologies, such as IoT, Big Data, Blockchain and AI. Particularly, the digital transformation allows artisans to connect with customers, expand their reach, and leverage their traditional craftsmanship skills in the modern era, ensuring the continued vitality of the craftsman sector in Italy.

Nevertheless, we suggest firms to be cautious in their transition to technological integration, depending on multiple factors such as the pool of customers they refer to and the size of their business. Indeed, even if craftsman can highly benefit from the implementation of these technologies, as confirmed by the analysis, it is opportune to remark the fact that most of these companies in Italy are SMEs, which requires them to evaluate and weight the right amount of technologies needed by their business, not to devote disproportionate investments with respect to the purpose they want to reach and, consequently, pay attention not to distort the brand, which could cause issues in terms of brand credibility with repercussions on customers' loyalty. Moreover, according to Peppard and Ward (2016), the cost of technology adoption is a big worry for businesses, and craftsmen businesses may experience comparable difficulties due to restricted financial resources.

Furthermore, craftsman companies should also be able to manage these tools and vertically integrate them into their value chain in order to exploit their full potential on the market, since there may be technical

expertise and skills gaps that need to be addressed (Högberg et al., 2017) during the transition through training and upskilling initiatives, in order to make the usage of these tools correct and appropriate. Indeed, we suggest crafts companies to heavily invest on R&D as part of their business strategy and accompany technological changes with vertical integration to exploit new ways of leveraging on production efficiency, by focusing on a business strategy which is comprehensive of production processes, omnichannel or multichannel strategies.

Although all of the hypotheses on direct effects have been confirmed with high robustness, it is particularly relevant the result depicted in the computation of the indirect effects, which made emerge an existing indirect effect of business strategy on industry 4.0 tech, with the introduction of a mediating variable represented by MB tech. In contrast, authors noticed that industry 4.0 do not serve as a facilitator to achieve a higher business performance, if not directly.

Among the reasons why marketing-based technologies act as a mediating factor between business strategy and the adoption of industry 4.0 technologies in the craftsman sector, there is their role in facilitating effective communication, providing customer insights, shaping value propositions, and responding to market demands. Taking out the most of these benefits, craftsmen can optimize their business strategy to better integrate and capitalize on the advantages supplied by industry 4.0 tech.

This would likely result in improved market reach and positioning, that can generate demand for new 4.0 technologies within the artisan sector (Gupta, V., 2020; Heiskanen et al., 2018). Through search engine marketing, craftsmen can identify emerging trends and better understand customer preferences, needs and expectations, and align their business strategy with industry 4.0 tech accordingly (Porter et a., 2015).

Indeed, by acting as a mediating factor between business strategy and industry 4.0 tech in the artisan sector, marketing-based technologies serve as a bridge, providing craftsmen with data-driven insights that inform their strategic decisions about how to adopt and implement 4.0 tech, whose usage has been empirically demonstrated to positively and directly impact on BP.

To conclude, considering the resistance to change typical of this industry, from employees who are unwilling to take a step toward the digital transition or who lack digital literacy (Kotter, 1995), we suggest companies to invest in marketing technologies before adopting tools such as AI or Big Data.

Typically, investments in such technologies are expensive and require enabling skills from employees, as well as larger investments and financial challenges (Freeman, R., 2019; Ross, A., 2017; World Economic Forum,2017). Therefore, our final managerial insight for this section is to invest, from a financial and human capital perspective, first for expansion and consolidation on the market through marketing and only consequently on 4.0 technologies.

Discussion of the findings after the introduction of commercial and tech-based contracts

The managerial insight we derive from the multigroup analysis with respect to group 1 is that whenever companies are signing both contracts, craft companies should expect an increase in their BP only through the implementation of industry 4.0 technologies and this will be, eventually, much better than signing only commercial, tech-based contracts or no contract at all. In fact, contracts can help facilitate the implementation of digital transformation efforts. Indeed, internal digital capabilities have a positive impact on firm performance, but this effect is stronger when digital transformation is fully implemented; internal contracts related to digital capabilities and transformation can help facilitate this implementation (Zhao *et al.*, 2021).

Generally, what results from the multigroup analysis, and particularly focusing on the last three comparisons is that, by adopting only one contract type, things seem not to differ very much with respect to our four variables. Whenever we compare both contracts with one or no contract, the result reveals that, in order to increase the business value of the company, signing both contracts can somehow boost it. Therefore, signing both contracts generally reveal to be a good idea.

However, whether companies are signing only commercial contracts (group 2), the BP can still increase with respect to the fact that they sign both, but this benefit will only come through the strengthening of their BS.

As for the relationship between operational strategy and digitalization, contracts can help establish clear expectations and responsibilities for both parties, as well as guarantee that there are mechanisms in place to monitor and evaluate the effectiveness of the relationship.

Indeed, to boost the effects of business strategy on the overall final business performance, if willing to achieve profit and sales growth, as well as competitiveness, market share and production efficiency, implementing commercial contracts is a better suited solution. This is mainly due to the fact that contracts can help ensure that the necessary resources are allocated to digital transformation efforts and that there is accountability for the success of these efforts (Moreno and Casillas, 2017), also corroborating the fact that relationships with external partners are well established and maintained.

Finally, comparing H3 before and after having introduced in our analysis the impact of contract change, we can notify that, even if marketing-based tech and industry 4.0 tech are correlated in a positive way, when it comes to contracts it is better to implement no contract at all, because it would result useless to the purpose of increasing tech 4.0 by marketing. Thus, signing no contract, crafts firms make it possible to increase their industry 4.0 technologies by implementing marketing-based technologies more advantageously, than signing some type of contracts among the one considered in the analysis.

The reason could be that other types of contracts, not included in our analysis, are better suited for the development of 4.0 technologies and, although in some respects the two variables are expected to go hand in

hand, they are not related in terms of contracts. Moreover, it is opportune to consider that when implementing industry 4.0 technologies by leveraging marketing-based technologies, the specific types of contracts used can vary depending on various factors, such as the nature of the technology and legal considerations.

Conclusions and future extensions

In this paper, we analyze the role of certain types of contracts to enhance the influence of our research hypotheses. We investigate whether there exists a contract type among tech-based contracts and commercial contracts through which firms can better exploit technologies and strategic choices to increase their overall business performance.

First, our findings confirm that business strategy has a significant positive impact on both marketing (Smith et al., 2019; Anderson et al., 2020; Garcia et al., 2021), 4.0 technologies (Johnson et al., 2020; Brown et al., 2019; Garcia et al., 2021) and on the overall business performance, whose sign is also established in previous research (Porter, 1985; Barney, 1991; Collis et al, 2008) for the craftsman industry. Moreover, our findings corroborate what claimed in the literature about the existing link between marketing-oriented tech and industry 4.0's (Smith et al., 2022; Brown et al., 2022; Garcia et al., 2023), allowing for expanding the research field to the craftsman sector in the last years, which is especially interesting considering the challenges brought to this sector by the Covid-19 pandemic in the two-years span considered in our investigation (2020-2022). Finally, the results also confirm our hypothesis on technologies' role in enhancing business performance by marketing and industry 4.0 advancements and determining superior performance.

Furthermore, our results do not show any non-significant impact among the direct relationships, contrary to some studies that report, for instance, discordant ideas on the fact that the relationship between technologies and business performance mainly concerns its net effect, since other factors make it difficult to understand whether there is a direct link between the two. However, our results confirm these direct effects and therefore corroborates the major shared idea among authors in the actual state of the literature.

Second, our findings confirm the assumption that adopting some contract types can significantly influence the effects of our hypothesis and increase the magnitude for some of them, namely H3, H4 and H6. However, we do not find statistical support for the impact that tech-based contracts have on the relationships among the variables, if not considering them together with commercial contracts. This finding differs from previous literature (Lee et al., 2015).

Finally, our findings suggest that parallel implementation of both contracts only partially results in a better variables association. This implies that the impact of marketing, industry 4.0 tech and business performance

does not always depend on the tech-based or commercial contracts enacted, rather on the type of contract adopted and the aim of the company.

Our findings provide important implications for managers and practitioners, as they not only contribute to the literature base, but also add content and inputs to research to progress.

Indeed, we see promising areas for further research: while there is a growing body of literature on the relationship between business strategy, technologies and business performance for the craftsman industry, there are still some gaps, specially on the role of contracts.

Precisely and according to Smith and Colins (2019), one gap is the lack of studies that focus specifically on the craftsman industry. Most studies tend to examine their relationships in broader contexts, such as manufacturing or service industries, rather than specifically considering craftsmen.

Moreover, our analysis limits on a two-year span. Consequently, researchers could continue from this point to conduct a study on the implications brought by marketing and industry 4.0 technologies on this industry, on matters concerning data privacy and security. With the adoption of marketing technological tools, craftsmen may collect and store a significant amount of customer and operational data. When positioning nationally or horizontally increases the size of the business, it becomes crucial to ensure data privacy and security for them to be able to comply with regulations and protection of sensitive information (Cavoukian et al., 2016).

Therefore, despite the gaps concerning the role played by contracts have been partially filled by our investigation, future research to look on these measures is needed. It could be interesting to consider our findings within a dynamic setting, on whether it occurs that firms are required to adjust or change their contracts according to arising challenges, and how these challenges can be predicted and overcome through the signing of certain contract types.

Also, we mentioned the problem of resistance to change of craftsman companies into our analysis, but this matter is neither extensively nor exhaustively explored in our investigation or in recent literature. Finally, our research can be complemented by adding and evaluating the role of resilience among the craftsman industry, from a longitudinal perspective. This research direction reflects an ongoing project that the authors have undertaken.

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Summary

Introduction and methodology

Italian craft businesses play a significant role in the Italian landscape and, although their national and local economic significance has been recognized and studied in the literature of management, it has not been sufficiently explored.

With the aim of investigating the nature and weights of the impact that business strategy, technologies and business performance have for these companies, the relationships among them have been investigated. An additional step has been carried out, to understand whether these relationships can be boosted by the implementation of some contractual models.
Indeed, the final purpose of this research is to understand whether the adoption of technology-based contracts for the maintenance of digital technologies and commercial contracts with clients and suppliers, as well as their combination, helps companies to achieve superior outcomes and increase performance.

Such investigation is useful to help craftsman companies understand how to develop their business model and achieve their strategic aims. As a result of the analysis, firms will be given managerial insights on how to effectively enhance performance through contracts.
In order to do so, we contacted, via phone and email, more than 2000 firms that specialize in crafts. 762 observations were collected from the questionnaire, with a 38% response rate.
Our survey focused on Italian crafts businesses from six different sectors, for which we only chose businesses whose primary focus is using manual labor techniques to produce (or repair) things.

Based on the literature review and accordingly to the gaps present in the literature, we developed some research hypotheses:

H1. Business strategy has a positive impact on marketing-based technologies
H2. Business strategy has a positive impact on industry 4.0 technologies
H3. Marketing-based technologies have a positive impact on industry 4.0 technologies
H4. Business strategy has a positive impact on business performance
H5: Marketing-based technologies have a positive impact on business performance
H6: Industry 4.0 technologies have a positive impact on business performance

We then built the following comprehensive conceptual model to help us in visualizing the data context and the links detected through the hypothesis formulation:

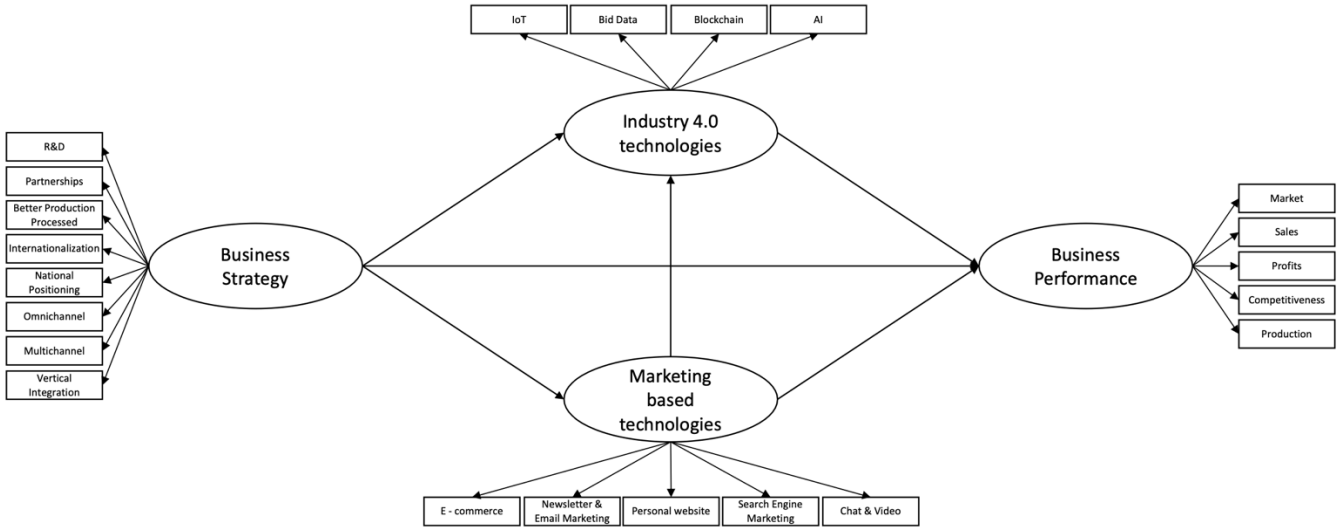

Figure I. Conceptual Model

The appropriateness of our inner model is confirmed by a relative goodness-of-fit index of 0,937.

Conducting the literary review, it also emerged the existence of relevant gaps in the literature with respect to these topics, that we aim to fill with our analysis.

First of all, the main gap is the lack of studies that focus specifically on the craftsman industry. Secondly, craftsman companies have been particularly impacted by the Covid 19 pandemic, generating a gap in the literature regarding how these changes are affecting the long-term sustainability of these businesses and the impact among the abovementioned relationships.

With respect to marketing-based strategies, literary evidence results to be still largely anecdotal. Further research is required also for 4.0 technologies, to understand how craft SMEs may use them to their advantage. More case-based and empirical studies in this area could aid in the identification of best practices and hazards to assist other craft firms in their digital transformation (Pisano et al., 2009; Luthra & Mangla, 2018; Moeuf et al., 2020).

Furthermore, while contracts play a vital role in various industries, it does not appear to us that their relevance with respects to the craftsman has been tackled in literature.

To contribute to the knowledge base and help craftsmen businesses thrive in the digital era, we aim to feel these research gaps.

With the above arguments and prior empirical evidence, we argue that the relationships underlying H1–H6 can be strengthened through the adoption of tech-based and commercial contracts.
To investigate how the introduction or change in contracts has an impact on the abovementioned hypothesis, we aim to quantify their impact by classifying in groups (Figure I), as follows:

GROUP 1 Both contracts change or are implemented	GROUP 2 Only commercial contracts are implemented
GROUP 3 Only tech-based contracts are implemented	GROUP 4 No contract changes or is implemented

Figure II. Group Matrix

To achieve the objectives of this study, we used partial least squares path modeling (PLS-PM) and the XL-Stat 2021.2.1 software. PLS-PM is a component-based estimate technique that predicts relationships between constructs and offers their scores on the original scale (Agyabeng-Mensah et al., 2020).
To determine the validity of the measures presented for the correlations, we computed exploratory factor analysis (EFA). It emerged that the factor "technology", initially intended to be explored as a unicum, needed to be distinguished into different components, focusing on technologies which are more marketing-oriented and on technologies proper of industry 4.0.
To assess the validity and compliance with the theorized conceptual model of the factors derived from the EFA procedure, we performed CFA in support for convergent validity and constructs' reliability, which delivered a Cronbach's alpha > 0,7 (Hair et al., 2009). In addition, we evaluated the convergent validity by analyzing the outer loadings and using the average variance extracted (AVE) criterion.
Finally, to estimate the conceptual model and investigate the direct and indirect effects among the variables, the partial least squares path modeling method was employed and H1–H6 tested, using XL-Stat. For the hypothesis testing on contracts, a multi-group analysis for the structural model's path coefficients was conducted. (The direct and indirect effects of the factors are displayed at

Table V and Table VI[4], respectively before and after including the impact of contracts in our analysis).

Discussion of the findings on BP, MB tech, 4.0 tech and BP

Interestingly, the impact of both MB and 4.0 technologies on BP is higher than the overall impact business strategy has on BP. Thus, the results of this study offer a genuine contribution to craftsmen by suggesting the implementation of technology systems that are composed of both marketing and more advanced technological tool, as this would result in higher levels of performance.

Therefore, the first insight is that, when firms are willing to increase their sales and profits, acquire a higher market potential, improve their production efficiency and gain a superior competitive advantage, they can rely on the implementation of a conjunct of technologies, both oriented to retain or acquire new customers and to strengthen their technological positioning through the employment of emerging technologies, such as IoT, Big Data, Blockchain and AI. Particularly, the digital transformation allows artisans to connect with customers, expand their reach, and leverage their traditional craftsmanship skills in the modern era, ensuring the continued vitality of the craftsman sector in Italy.

Nevertheless, we suggest firms to be cautious in their transition to technological integration, depending on multiple factors such as the pool of customers they refer to and the size of their business. Indeed, even if craftsman can highly benefit from the implementation of these technologies, as confirmed by the analysis, it is opportune to remark the fact that most of these companies in Italy are SMEs, which requires them to evaluate and weight the right amount of technologies needed by their business, not to devote disproportionate investments with respect to the purpose they want to reach and, consequently, pay attention not to distort the brand, which could cause issues in terms of brand credibility with repercussions on customers' loyalty. Moreover, according to Peppard and Ward (2016), the cost of technology adoption is a big worry for businesses, and craftsmen businesses may experience comparable difficulties due to restricted financial resources.

Furthermore, craftsman companies should also be able to manage these tools and vertically integrate them into their value chain, in order to exploit their full potential on the market, since there may be technical expertise and skills gaps that need to be addressed (Högberg et al., 2017)

[4] Table V and Table VI are not present in the summary, but can be found in the main thesis dissertation.

during the transition through training and upskilling initiatives, in order to make the usage of these tools correct and appropriate. Indeed, we suggest crafts companies to heavily invest on R&D as part of their business strategy and accompany technological changes with vertical integration to exploit new ways of leveraging on production efficiency, by focusing on a business strategy which is comprehensive of production processes, omnichannel or multichannel strategies.

Although all the hypotheses on direct effects have been confirmed with high robustness, it is particularly relevant the result depicted in the computation of the indirect effects, which made emerge an existing indirect effect of business strategy on industry 4.0 tech, with the introduction of a mediating variable represented by MB tech.

Taking out the most of marketing tools' benefits, craftsmen can optimize their business strategy to better integrate and capitalize on the advantages supplied by industry 4.0 tech. Indeed, by acting as a mediating factor between business strategy and industry 4.0 tech in the artisan sector, marketing-based technologies serve as a bridge, providing craftsmen with data-driven insights that inform their strategic decisions about how to adopt and implement 4.0 tech, whose usage has been empirically demonstrated to positively and directly impact on BP.

To conclude, considering the resistance to change typical of this industry, from employees who are unwilling to take a step toward the digital transition or who lack digital literacy (Kotter, 1995), we suggest companies to invest in marketing technologies before adopting tools such as AI or Big Data. Typically, investments in such technologies are expensive and require enabling skills from employees, as well as larger investments and financial challenges (Freeman, R., 2019; Ross, A., 2017; World Economic Forum,2017). Therefore, our final managerial insight for this section is to invest, from a financial and human capital perspective, first for expansion and consolidation on the market through marketing and only consequently on 4.0 technologies.

Discussion of the findings after the introduction of commercial and tech-based contracts

The managerial insight we derive from the multigroup analysis with respect to group 1 is that whenever companies are signing both contracts, craft companies should expect an increase in their BP only through the implementation of industry 4.0 technologies and this will be, eventually, much better than signing only commercial, tech-based contracts or no contract at all.

Generally, what results from adopting only one contract type, things seem not to differ very much with respect to our four variables. Whenever we compare both contracts with one or no contract, the

result reveals that, in order to increase the business value of the company, signing both contracts can somehow boost it. Therefore, signing both contracts generally reveal to be a good idea.

However, whether companies are signing only commercial contracts (group 2), the BP can still increase with respect to the fact that they sign both, but this benefit will only come through the strengthening of their BS.

As for the relationship between operational strategy and digitalization, contracts can help establish clear expectations and responsibilities for both parties, as well as guarantee that there are mechanisms in place to monitor and evaluate the effectiveness of the relationship.

Indeed, to boost the effects of business strategy on the overall final business performance, implementing commercial contracts is a better suited solution. This is mainly due to the fact that contracts can help ensure that the necessary resources are allocated to digital transformation efforts and that there is accountability for the success of these efforts (Moreno and Casillas, 2017), also corroborating the fact that relationships with external partners are well established and maintained.

Finally, comparing H3 before and after having introduced in our analysis the impact of contract change, we can notify that, even if marketing-based tech and industry 4.0 tech are correlated in a positive way, when it comes to contracts it is better to implement no contract at all, because it would result useless to the purpose of increasing tech 4.0 by marketing. Thus, signing no contract, crafts firms make it possible to increase their industry 4.0 technologies by implementing marketing-based technologies more advantageously, than signing some type of contracts among the one considered in the analysis.

Concluding remarks and future extensions

In this paper, we analyze the role of certain types of contracts to enhance the influence of our research hypotheses and investigate whether there exists a contract type among tech-based contracts and commercial contracts through which firms can better exploit technologies and strategic choices to increase their overall business performance.

First, our findings confirm that business strategy has a significant positive impact on both marketing (Smith et al., 2019; Anderson et al., 2020; Garcia et al., 2021), 4.0 technologies (Johnson et al., 2020; Brown et al., 2019; Garcia et al., 2021) and on the overall business performance, whose sign is also established in previous research (Porter, 1985; Barney, 1991; Collis et al, 2008) for the craftsman

industry. Moreover, our findings corroborate what claimed in the literature about the existing link between marketing-oriented tech and industry 4.0's (Smith et al., 2022; Brown et al., 2022; Garcia et al., 2023), allowing for expanding the research field to the craftsman sector in the last years, which is especially interesting considering the challenges brought to this sector by the Covid-19 pandemic in the two-years span considered in our investigation (2020-2022). Finally, the results also confirm our hypothesis on technologies' role in enhancing business performance by marketing and industry 4.0 advancements and determining superior performance.

Furthermore, our results do not show any non-significant impact among the direct relationships, contrary to some studies that report, for instance, discordant ideas on this topic. However, our results confirm these direct effects and therefore corroborates the major shared idea among authors in the actual state of the literature.

Second, our findings confirm the assumption that adopting some contract types can significantly influence the effects of our hypothesis and increase the magnitude for some of them, namely H3, H4 and H6. However, we do not find statistical support for the impact that tech-based contracts have on the relationships among the variables, if not considering them together with commercial contracts. This finding differs from previous literature (Lee et al., 2015).

Finally, our findings suggest that parallel implementation of both contracts only partially results in a better variables association. This implies that the impact of marketing, industry 4.0 tech and business performance does not always depend on the tech-based or commercial contracts enacted, rather on other type of contracts adopted and the aims of the company.

Our findings provide important implications for managers and practitioners, as they not only contribute to the literature base, but also add content and inputs to research to progress.

Indeed, we see promising areas for further research: while there is a growing body of literature on the relationship between business strategy, technologies and business performance for the craftsman industry, there are still some gaps, especially on the role of contracts.

Precisely and according to Smith and Colins (2019), one gap is the lack of studies that focus specifically on the craftsman industry. Most studies tend to examine their relationships in broader contexts, such as manufacturing or service industries, rather than specifically considering craftsmen.

Moreover, our analysis limits on a two-year span. Consequently, researchers could continue from this point to conduct a study on the implications brought by marketing and industry 4.0 technologies on this industry, on matters concerning, for instance, their consequences, such as data privacy and security. With the adoption of marketing technological tools, craftsmen may collect and store a significant amount of customer and operational data; when positioning nationally or horizontally increases the size of the business, it becomes crucial to ensure data privacy and security for them to be able to comply with regulations and protection of sensitive information (Cavoukian et al., 2016).

Therefore, despite the gaps concerning the role played by contracts have been partially filled by our investigation, future research to look on these measures is needed. It could also be interesting to consider our findings within a dynamic setting, on whether it occurs that firms are required to adjust or change their contracts according to arising challenges, and how these challenges can be predicted and overcome through the signing of certain contract types.

Also, we mentioned the problem of resistance to change of craftsman companies into our analysis, but this matter is neither extensively nor exhaustively explored in our investigation or in recent literature. Finally, our research can be complemented by adding and evaluating the role of resilience among the craftsman industry, from a longitudinal perspective. This research direction reflects an ongoing project that the authors have undertaken.