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AN EMPIRICAL MODEL OF ANTECEDENTS OF MARKETING INFORMATION TECHNOLOGY (MARTECH) ADOPTION

***Abstract.** In a constantly evolving society, marketing technology (MarTech) is part of the foundation of efficient business practice and market success. The aim of our research is to understand and theorise the antecedents of MarTech adoption for Romanian companies. We have developed an empirical model based on structural equations to predict the behavioural intent of users to adopt MarTech-type technologies. The results obtained in this article highlight the most used categories of MarTech tools and the factors that contribute to the decision to implement MarTech technologies in Romanian companies. Thus, the extent and intensity of the links between the IT knowledge of the users, the perceived risks, the general attitude, and the perceived benefits, and the adoption of a decision to implement Martech technologies are highlighted.*

***Keywords:** marketing technology; online marketing; Martech; marketing information system; marketing models*

JEL Classification: M31

1. Introduction

The concept of MarTech (Marketing Technology) is one of the latest forms of explaining the prevalent relation between marketing techniques and various ICT techniques, which facilitate it in modern days. Starting over 40 years ago, the implementation of marketing tools supported by computers and communication mediums, in various forms, was labelled as marketing information systems, computer-mediated marketing, or marketing automation. Now, the concept refers to all ICT tools used to achieve marketing goals and are ubiquitous and varied, facilitating promotion, distribution, pricing, or customer care, to name just a few [1]. MarTech actually supports almost all marketing functions within an organisation, bringing together marketing, business, and technology practices in order to foster organisational growth [2].

Marketing technology provides a complete representation of the target, adapts web material to the user's needs and interests, and allows for the speedier discovery of new clients. This strategy improves the ability of commercial teams to find consumers interested in the company's offerings more quickly and in a relevant way [2]. Marketing technology, or "Martech", refers to technology used to reach online customers in order to deliver a superior customer experience, meaningfully engage them, and keep them. Artificial intelligence, augmented/virtual reality, the Internet of Things, natural language processing, and block chain technology are the most recent examples [3].

At the beginning of the first decade of this century, the majority of the Martech solutions used around the world were dedicated to: relationships and social networking (with a market share of 24.6%) and content and experience (24.20%). The two abovementioned segments represented, practically, half of the world market. The rest of Martech's solutions were dedicated to trading and sales (16.4%), data (15.7%), advertising and promotion (11.5%), and management (7.5%) [4].

Data unification is one of the most prevalent MarTech tools now. It focuses on collection, standardisation, integration, and storage of data, as well as analyse it and use it to support informed decisions and knowledge generation for various marketing purposes. It also facilitates the use of artificial intelligence techniques, such as deep learning, chatbox technology, or neural networks in order to automate marketing solutions for customer and supplier management, pricing, promotion, or co-creation [5].

2. MarTech evolution and trends

The medical crises that have affected humankind over the last two years have induced significant social changes. As a direct result, customer behaviour and marketing techniques were affected and transformed significantly during this period. People travelled much less, did a lot of their work related and entertainment related activities at home and, in order to reach them, organisations needed new approaches in order to build relations, generate goodwill and leads, scale information, and foster

relations with their stakeholders. As a result, the traditional 4P approaches of the marketing mix have garnered two more dimensions, specific to online and Martech tools: interactivity and individualisation [6].

Marketing technology allows for a more thorough description of the target, customises online material to the user's requirements and interests, and detects new clients quickly. This method helps commercial teams do a better job of identifying people who are interested in the company's offerings more quickly and effectively. Furthermore, based on the user's digital activity, some predefined scenarios are activated for each target group (in mailings) or visitor (on webpages) in order to offer customised online content that suits the user's wants and searches [7].

Current trends of MarTech focus on unifying data sources and using technologies such as cloud computing and recommender systems to generate real-time insights and leads, rely on data scientists to generate and manage customer data, and include artificial intelligence techniques and large-scale automation for real-time analytics. Ad servers and various similar technologies need to make informed marketing decisions in time intervals that are usually too small for average persons to react in, so a competitive MarTech ecosystem is essential for long-term market success [8].

In our studies, in order to identify the most critical markets for MarTech technologies globally, we used three indicators, namely:

- 1) Number of MarTech companies in each country (percentage)
- 2) Number of jobs (relative to the average salary) created in the field of online marketing technologies in each country (percentage)
- 3) Investments in digital marketing per consumer in each of these countries (percentage)

The three indicators for the analysis of the global situation were selected, based on the information identified in The Martech Report 2021/22, produced by the MarTech Alliance in partnership with Moore Kingston Smith [9]. This report analyses the marketing technologies from the industry's point of view, highlighting the MarTech budgets, the benefits and challenges around the technology, and some of the key technologies in which the organisations have invested in the last 12 months.

According to the results of exploratory research conducted in this article, the eight leading economies identified for MarTech technologies are the United States, the United Kingdom, China, Sweden, the Netherlands, Canada, Germany, France. The data in this table was obtained through exploratory research on the data collected and presented in sites and profile reports (for example, statista.com). The data presented in the table were taken and easily processed using research conducted and published on the site. ul statista.com [10]. Thus, the data collected are in the table (Table 1) below, after they have been normalised starting from the maximum value at the national level:

Table 1: The primary savings identified for MarTech technologies

The country	Number of companies	Average salary	Investment	Position
Canada	10%	67%	41%	6
China	4%	100%	27%	3
South Korea	2%	53%	25%	10
United Arab Emirates	2%	54%	28%	9
France	7%	65%	17%	8
Germany	9%	58%	26%	7
India	5%	25%	1%	15
Ireland	2%	53%	22%	14
Israel	6%	49%	24%	11
The UK	22%	58%	89%	2
The Netherlands	5%	81%	36%	5
Singapore	4%	44%	28%	13
Spain	3%	61%	13%	12
The United States of America	100%	98%	100%	1
Sweden	4%	72%	48%	4

Because they are on trend, we can list the top 12 best tools and companies that use the Martech concept: ContentGrow, HubSpot CRM, Treasure Data, Typeform, Crisp, Zoho Mail, SendPulse, SpyFu, Edgar, Criteo, PRNewswire, Smart2VR.

3. A study of MarTech adoption and impact

Analysing the evolution of MarTech solutions, Scott Brinker [11] formulated the following conclusions, which can serve as a basis to identify the prospects of the global market for marketing technologies in a hyperconnected digital context, permanently available and controlled by the customer.

- (1) marketing as a whole has become a field with unquestionable technological support;
- (2) The number of initiatives (projects or suppliers) MarTech is an excellent barometer of how marketing is evolving;
- (3) The field of marketing technologies is heterogeneous and includes an extensive range of products;
- (4) In order to perform in this environment, marketers must constantly develop their technical skills.

Over the last decade, MarTech solutions and tools experienced a sharp growth curve, with over 70% annual increase in sales. However, the last few years, the growth rate looks to have peaked, with values within the single digits, probably indicated that the market is entering a maturity phase, while we are getting ready for new generations of applications that will improve marketing competitiveness and global coverage [12].

With more than 8000 MarTech solutions available worldwide [12], there is both an increased market pressure, as well as a wide variety of similar products, which makes marketers able to pick the best tool for their particular jobs and particular markets. Usually, MarTech solutions fall under one of six categories: Advertising & Promotion, (which makes up about 12% of the market), Sales Promotions and Lead Generation (about 14% of the overall MarTech solutions market), Content Generation (which makes the bulk of this category, for about 25%), Data Science and Analytics (about 17%), Logistics and Distribution (about 8%), and Social Media and Customer Management (about 24%, the fastest growing segment, especially during the COVID-19 pandemic). The website <https://martech5000.com>, a portal specialised in MarTech solutions analytics, mentions that the previous decade saw an overall growth of over 5000% in terms of tools providers for marketers across the world, a trend that will likely continue in the follow years, a fact detailed in Figure 1 showed below [12].

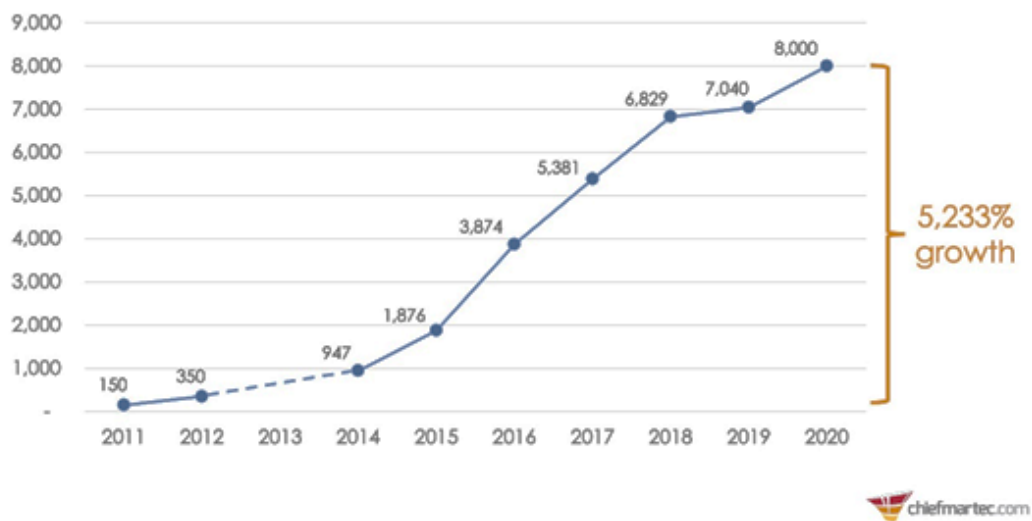


Figure 1. Dynamics of the number of MarTech solution providers worldwide 2011-2020

4. Materials and Methods

MarTech technologies are gaining popularity among users because they target a large population, from teenagers to retirees, from professionals to vacationers. As MarTech technologies spread, organisations are forced to turn the strategic threats of these new technologies into strategic opportunities, as MarTech has become a valuable marketing tool [13].

As a result, we have built an empirical model to explain marketers' intention to adopt MarTech applications for organisational use, based on the factors that contribute to this issue. The purpose of this proposed empirical model is to identify the factors that contribute to behavioural intention of the marketers to use MarTech type technologies, and our research hypotheses include:

- H1. There is a direct link between the user experience in the IT area (ITExpert) and the perceived risks of using Martech technologies (PRisks).
- H2. There is a direct link between trust in Martech technologies (trust) and perceived risks of using Martech technologies (PRisks).
- H3. There is a direct link between perceived control (control) and perceived risks of using Martech technologies (PRisks).

For example, for the forms of the first three hypotheses, we relied on studies based on which, in the banking area, the perceived risks associated with self-service based on the technology offered to customers and users (employees) negatively influence the attitude of managers towards adopting such technology [14].

- H4. There is a direct link between perceived control (Control) and user experience in the IT area (ITExpert). O5. Determining the intensity of the link between the perceived risks of using Martech technologies (PRisks) and the attitude of the beneficiaries towards Martech technologies (Attitude).
- H5. There is a direct link between perceived risks of using Martech technologies (PRisks) and the attitude of the beneficiaries towards Martech technologies (Attitude).

As in the case of banking services, data can be extrapolated to any field involving new technologies. If perceived risks are significant, then the attitude of decision makers toward their adoption may be harmful [14]. On the contrary, if the perceived risks are minimal or insignificant, then the attitude of decision makers towards their adoption will be positive.

- H6. There is a direct link between perceived control (control) and the intention to adopt Martech technologies (Martech).
- H7. There is a direct link between social norms (NormBe) and the intention to adopt Martech technologies (Martech).

Regarding perceived control and the social norms, variables apparently without a close connection but with a similar impact, we can say that they represent two of the essential variables of the proposed conceptual model. Perceived control and social norms are variables related to decision makers' ability and perception of

the benefits of adopting Martech-type technologies. Despite the existence of a strong appetite for the adoption of marketing tools, and a clear recognition of its opportunities, especially related to how it could create a stronger orientation towards the market, adhering to the principles of efficient reasoning [14] is usually difficult.

H8. There is a direct link between the perceived benefits of MarTech (PBenef) and the intention to adopt MarTech technologies (MarTech).

H9. There is a direct link between the perceived benefits of MarTech (PBenef) and the attitude of the beneficiaries towards MarTech technologies (Attitude).

H10. There is a direct link between the attitude of the beneficiaries towards MarTech technologies (Attitude) and the intention to adopt MarTech technologies (MarTech).

In order to validate our research, a questionnaire was formulated consisting of 20 questions, of which 3 filter questions, and we measured our constructs using a five-step Likert scale (1 - Total disagreement to 5 - Total agreement).

We gathered data from a sample of 124, using an online questionnaire through the isondaje.ro platform.

Table 2. Structure of the sample.

Sample Structure		
Gender	Women	78%
	But	22%
Level of education	bachelors, masters, doctorates	80%
	secondary education	20%
Occupation	employees or entrepreneurs	90%
	pupils / students	7%
	without occupation	3%
Incomes	below USD 530	12%
	over USD 530	88%
Environment of residence	urban areas	89%
	rural areas	11%

According to the literature, the number of respondents is sufficient because the general complexity of a structural model does not affect the sample size requirements. PLS-SEM is also a good choice when the sample size is restricted because it has more substantial statistical power in scenarios with model structures or fewer sample numbers [15].

5. Results

To graphically transpose the proposed conceptual model, several indicators must be analysed regarding the correctness of data collection their completeness (ability to cover a range of items of a variable, uniformity of answers, their completeness, and so on). For this first validation, the analysis was used using the WarpPLS programme and the results were as follows.

Average path coefficient (APC) = 0.310, P <0.001

Average R-squared (ARS) = 0.502, P <0.001

Average adjusted R-squared (AARS) = 0.501, P <0.001

Average block VIF (AVIF) = 2.185, acceptable if ≤ 5 , ideally ≤ 3.3

Average full collinearity VIF (AFVIF) = 2,975, acceptable if ≤ 5 , ideally ≤ 3.3

Tenenhaus GoF (GoF) = 0.616, small > 0.1 , medium > 0.25 , large > 0.36

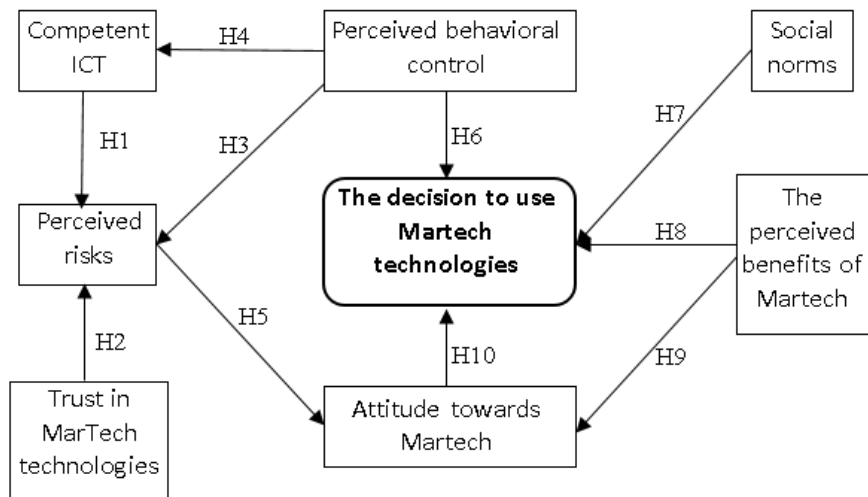
Simpson's paradox ratio (SPR) = 1,000, acceptable if > 0.7 , ideal = 1

R-squared contribution ratio (RSCR) = 1,000, acceptable if > 0.9 , ideal = 1

Statistical suppression ratio (SSR) = 1,000, acceptable if > 0.7

*Nonlinear bivariate causality direction ratio (NLBCDR) = 1,000,
 acceptable if > 0.7*

Figure 8: The proposed conceptual model for identifying the factors that contribute to the decision to use MarTech technologies.



We evaluated the internal consistency and validity of our constructs using Cronbach's alpha and extracted average variants. (Table 3) [16].

Table 3. Latent Variable Coefficients

	expert	risks	Trust	Control	Martech	PBenef	Attitude	NormBe
Cronbach's alpha	0.833	0.863	0.869	0.786	0.793	0.922	0.869	0.805
Average variances extracted	0.857	0.785	0.792	0.549	0.708	0.719	0.792	0.837
Q-squared	0.217	0.679	-	-	0.491	-	0.623	-
R squared	0.215	0.680	-	-	0.490	-	0.624	-

The Cronbach's alpha statistic is used to assess the measurement's validity, defined as how error-free and consistent the results are. To provide a measure of internal consistency [17], the indicator must be represented as a number between 0 and 1. The variables' validity is evaluated by the AVE's test is applied, where values of over 0.5 are expected [18]. Discriminant validity suggests that the measurements were accurate within the proposed conceptual model, as shown in Table 4.

Table 4. Correlations among latent variables with the square root of AVEs (extracted average variance)

	expert	risks	Trust	Control	Martech	PBenef	Attitude	NormBe
expert	(0.926)	0.713	0.667	0.455	0.515	0.731	0.766	0.533
risks	0.713	(0.886)	0.748	0.535	0.559	0.806	0.719	0.638
Trust	0.667	0.748	(0.890)	0.409	0.541	0.790	0.765	0.532
Control	0.455	0.535	0.409	(0.741)	0.616	0.463	0.461	0.463
Martech	0.515	0.559	0.541	0.616	(0.841)	0.529	0.566	0.438
PBenef	0.731	0.806	0.790	0.463	0.529	(0.848)	0.759	0.623
Attitude	0.766	0.719	0.765	0.461	0.566	0.759	(0.890)	0.509
NormBe	0.533	0.638	0.532	0.463	0.438	0.623	0.509	(0.915)

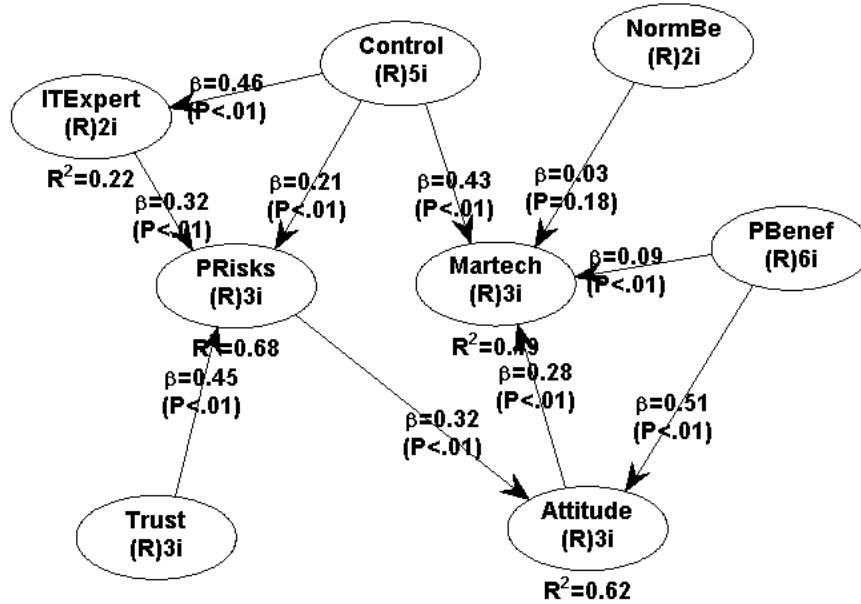
The standardised coefficients for each causal connection in the model are first calculated and assessed. The Beta coefficients values show the strength of influences between the variables; Beta coefficients values of 0.1 or greater show support for a certain hypothesis whenever their corresponding significance thresholds have p values below 0.05.

Table 5. Validation of the leading hypotheses by the connection coefficients.

	Main Hypotheses	β	p	Validation
1	user experience in the IT area (ITExpert) -> perceived risks of using Martech technologies (PRisks) 1.	0.32	<0.01	Yes
2	trust in Martech technologies (Trust) -> perceived risks of using Martech technologies (PRisks).	0.45	<0.01	Yes
3	perceived control (Control) -> perceived risks of using Martech technologies (PRisks).	0.21	<0.01	Yes
4	perceived control (Control) -> user experience in the IT area (ITExpert).	0.46	<0.01	Yes
5	perceived risks of using Martech technologies (PRisks) -> the attitude of the beneficiaries towards Martech technologies (Attitude).	0.32	<0.01	Yes
6	perceived control (Control) -> the intention to adopt Martech technologies (Martech).	0.43	<0.01	Yes
7	<i>social norms (NormBe) -> the intention to adopt Martech technologies (Martech)^l</i>	0.03	= 1.18	No
8	perceived benefits of MarTech (PBenef) -> intention to adopt Martech technologies (MarTech).	0.09	<0.01	Yes
9	perceived benefits of MarTech (PBenef) -> the attitude of the beneficiaries towards MarTech technologies (Attitude).	0.51	<0.01	Yes
10	the attitude of the beneficiaries towards Martech technologies (Attitude) -> the intention to adopt Martech technologies (Martech).	0.28	<0.01	Yes

Following the validation of the hypotheses, the proposed conceptual model extracted from the WarpPLS programme can be highlighted, in which the Beta indicators and their probability are highlighted in graphical form and their probability (Figure 9).

Figure 9. Validated model on the factors that contribute to the decision to use MarTech technologies.



The percentage in which independent latent variables explain (determine / influence) the fluctuation of dependent variables is represented by the determination coefficients R^2 [19]. Table 6 shows the WarpPLs software results to compute these for each component-dependent variable in the proposed model. It should be emphasised that when the coefficient of determination R^2 is greater than 0.1, a variable predictor can be considered to have high explanatory power.

Table 6. Coefficients of determination R^2

expert	risks	Martech	Attitude
0.215	0.680	0.490	0.624

In the case of the present investigation, we can observe that most of the R values are close to 1, which indicates that the predictor variables can be considered to have significant explanatory power.

6. Discussion

Before drawing a parallel between the results obtained in modelling by structural equations, we can bring to the fore the results obtained in the classical research (based on the answers given by the respondents in the questionnaire). Thus, following the application of the questionnaire, the following points were obtained

that can contribute to the enrichment of the literature on the subject of marketing technologies: it seems that (1) the main factors that contribute to the decision to adopt MarTech technologies are technological aspects of innovation and how the benefits are perceived) (50% of respondents chose this answer); (2) individual content (31%), the automation of traditional labor-intensive tasks (22%) and efficient organizational processes (25%); (3) the main benefits refer to the easy identification of consumers' wishes (34%), the conversion of customers in the online environment (24%) and the construction of profitable business relationships (21%); (4) in 67% of cases, the marketing budget was increased at the time of the implementation of MarTech technologies; (5) in 88% of cases, a reduction of the time for solving the problems within the organization was observed; and in (6) 44% of cases the efficient use of MarTech technologies resulted in an increase in the organization's revenues.

In this article, a series of variables have been constructed, starting from the essential items used in their construction to determine the links between the identified influencing factors and the decision to adopt MarTech technologies. The findings indicated that most of the proposed links between the factors considered in creating the proposed conceptual model were validated, highlighting the impact of knowledge and perceptions on the adoption of MarTech technologies. As in the case of this article, other studies highlight a positive attitude and a natural appetite for the adoption of marketing technology, associating it with an opportunity to interact with customers at a deeper and more interactive level [20]. Moreover, the perceived benefits of implementing MarTech-type technologies are well known, even in the case of people who have not extended this activity to their business. [21]

Regarding the fact that IT experience and digital skills impact the implementation of MarTech technologies, as demonstrated in this article, another study shows that lack of technical skills can hinder the ability or initiative of decision makers to translate into a positive vision adopting MarTech technologies [22].

Therefore, we observe both in Table 5 and in Figure 9 the way in which the connections between the variables were confirmed or not. Thus, it can be highlighted that except for the hypothesis with number 7, all others were validated, stating that there is a direct and close connection between the two analyzed factors. The experience of users in the IT area obviously influences the risks perceived by them in the use of MarTech technologies, a fact that has been confirmed in other specialised works [14]. The proposed No. 2 hypothesis refers to the trust placed in MarTech-type technologies (gained from one's own experience or from the experience of other entities) and the perceived risks. And in this case, a direct link between the two variables was highlighted, the experience generally diminishing the perceived risks on some novelty elements. For example, we may associate the implementation of MarTech technologies with online shopping: An individual who has had previous positive experiences with this activity will continue to feel a low level of risk [23].

Hypotheses 3 and 4 refer again to a link between the variables related to perceived risks (according to the degree of consciously perceived control). People tend to

perceive low risks on the things they can control, which contributes to the attitude towards novelty elements (such as MarTech technologies), to the benefits felt, but also to the intention to adopt the novelty elements (such as are highlighted in the hypotheses validated within the proposed conceptual model I5, I6, I8, I9). Another example that contributes to the confirmation of the validation of the enumerated hypotheses is that intersituational differences in choice behavior should be interpreted in the expected utility as differences in attitude towards risk or by highlighting factors that contribute to the perception of relative risk of alternatives, choice, experience, knowledge in a certain field, or information taken from other sources [24].

Therefore, we note that the literature is not foreign to the hypotheses proposed in this article, even contributing to their formulation. However, it is enriched with a new confirmatory situation of the connections between the already known elements (transposed in the form of variables) in terms of attitude and intention to use MarTech tools and applications.

7. Conclusions

Digital technology enables new ways of organising economic activities, reduces the costs and time associated with intermediaries, increases confidence in the ecosystem of actors, and impacts corporate innovation. Changes in corporate operations, transformation, and innovation are the result of digital technology. Companies that use new technology, such as new digital technologies, perform better in terms of innovation. Furthermore, understanding different regional elements and consumer behaviour is critical to success in international market needs in a modern business environment. According to Ajzen and Fishbein, two determining elements could influence a person's desire to perform a specific act; the first is connected to attitude toward conduct), and the second is social influence, particularly subjective norms (subjective norms) [25].

Due to the advent of information technology, many individuals and companies now have a wider range of physical (equipment) and electronic (data) assets at risk. Following the findings of this article, it is suggested that business managers and organisations assess their business processes and practises in the field of business model, taking into account the impact of new digital technologies and worldwide marketplaces on business innovation in emerging countries. It is also suggested that academics investigate the relationship between digital technologies and corporate marketplaces using various mediation variables such as knowledge management, market capacity, and so on.

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