A DEMAND-SIDE PERSPECTIVE OF BIOECONOMY: THE INFLUENCE OF ONLINE INTELLECTUAL CAPITAL ON CONSUMPTION

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Please cite this article as:
Vătămănescu, E.-M., Alexandru, V.-A., Cristea, G., Radu, L. and Chirica, O., 2018. A Demand-Side Perspective of Bioeconomy: The Influence of Online Intellectual Capital on Consumption. *Amfiteatru Economic*, 20(49), pp. 536-552.

DOI: 10.24818/EA/2018/49/536

Article History
Received: 23 March 2018
Revised: 15 May 2018
Accepted: 5 June 2018

Abstract

The present paper aims to address a demand-side perspective of bioeconomy by laying emphasis on the digitalization of markets and, subsequently, on the consumption patterns at the macroeconomic scale. The imperative for a sustainable economic model corroborated with the advances in digital technologies usage have reconfigured consumers' approaches and expectations and availed new forms of consumer behavior. Among these, the development of consumer-based online communities and of the online intellectual capital have often come forth as an undertaking of empowered consumers pursuing knowledge-based consumption patterns. The quest for sustainable, bio-labeled products on the digital markets has cemented the formation of new social aggregations built on the similarity of interests, goals, values, expectations, preferences, etc., giving way to consistent communication and interaction flows among their members and engendering profound transformations in today's society. Acknowledging all these facts, the study investigates the influences of the online intellectual capital on the consumption patterns through the lens of bioeconomy. The focus is set on the bio products consumption in two European countries (i.e., Romania and Italy), relying on a sample of over 700 active online consumers. Processed via a structural equation modeling technique, the data indicated the existence of significant influences among the considered variables.

Keywords: intellectual capital (IC), online communities**,** consumption, bio products, bioeconomy, digitalization.

JEL Classification: D18, F12, F68.

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Introduction

In this context of today's economy, the fundamental transformation of economic systems is often seen as a solution of last resort to stagnation given the fact that, in the current economic models, "prices faced by producers and consumers (…) do not reflect environmental and social costs adequately" (Le Blanc, 2011, p. 151). Thus, transformation processes advocated by various scholars (Bina, 2013; Mazzucato and Perez, 2014) and policy makers (i.e., the Green Economy Initiative GEI, launched by the United Nations Environment; the Sustainable Development Goals, launched by United Nations Development Program) alike are more than ever focusing on bioeconomy – as opposed to the *lock-in in carbon-based technologies* (Unruh, 2000) – and on its potential to boost competitiveness and innovation.

In line with the EU documents, bioeconomy could be defined as the "production of renewable biological resources (biomass) and their conversion to food, feed, bio-based products and bioenergy" (European Commission, 2005, 2012; Trigo et al., 2013). Its higher aim resides in improved human well-being and social equity, with a significant reduction of environmental risks and ecological scarcities (UN Environment, 2018). If supported by national policies and institutions, the trade opportunities created by bioeconomy can enhance economic growth while helping states achieve their sustainable development goals.

For these profound and essential transformations to happen, two important technological aspects become of topical importance, as Pyka (2017) highlights: 1. *Digitalization*, including the key technological advancements given by artificial intelligence, robots, and augmented reality, all the more so as, launched in May 2010, the digital agenda for Europe has been designed to help unleash Europe's economic potential by means of the sustainable economic and social benefits deriving from the implementation of the digital single market (European Commission, 2010); 2. The so-called "*knowledge-based bioeconomy*" which replaces – in many applications – oil-based by bio-based materials. According to the Research Directorate-General European Commission (2009), "bioeconomy" includes all industries and economic sectors that produce, manage and otherwise exploit biological resources (e.g. agriculture, food, forestry, fisheries, etc.).

Building of these conceptual keystones which integrate the dynamics of digitalization and the multifield knowledge-based bioeconomy, the current paper aims at discussing the influences of the online intellectual capital brought forward by the digital economy on online consumption patterns and the consumer behavior related to bio products. The embraced approach relies on three pillars, that is: a. a consumer-friendly digital single market is one of the key priorities of EU's 2010 Digital Agenda; b. the emergence of new forms of intellectual capital (i.e., online intellectual capital) reconfigures the logic of the digital economy and gives way to empowered consumers and to knowledge-based consumption patterns; c. the propensity towards the consumption of bio products contributes as a pivotal incentive to the development of a "bioeconomic model" from the demand-side level. It is in this particular point that the main paper contribution is objectivized in that most of the studies on bioeconomy start from the inputs of the bioeconomic processes, focusing less on the stakeholders' influence. Hence, shifting the focus towards the consumers' online communities (Forman et al., 2008; Zhao et al., 2013), which assume "social responsibility" (Hobart and Sendeck, 2016) in their approach to sustainability and bio products, catalyzes a multidimensional comprehension of the current bioeconomic model.

These aspects considered, the paper was structured as follows. Firstly, the theoretical background is developed, with a special focus on the digitalization of the in the digital economy and on the online intellectual capital availed by the online communities. Secondly, the research purpose, objectives, hypotheses and methodology are presented. Thirdly, after the introduction of the conceptual framework, the measurement and structural models are assessed as derived from a structural equation modeling technique. Finally, the results are reported and discussed in terms of overall implications, limitations and future avenues.

1. Literature review

1.1. The digitalization of consumption patterns

In the knowledge-based bioeconomy, a massive leap towards sustainability requires both the supply-side (i.e., companies, producers) and the demand-side (i.e., consumers) to identify and implement new coordination and adaptive capacities. From the demand-side perspective, household access to broadband has determined a boost in internet purchases – from 59% (EU-28 in 2012) to 68% (EU-28 in 2017) (Eurostat, 2018). This is indicative of the fact that today's economy is facing major challenges and the digitalization has become auspicious due to the easy and affordable access to an Internet connection in most parts of the world (Van Gorp, 2015). As reported by the World Bank (2016), 40% of the world's population had access to the Internet, the evolution of different technologies (mobile communications, digital platforms, big data, cloud computing and social media) dramatically altering the way people interact, buy and inform themselves about products and services (Maher et al., 2016).

The transformations of the digital markets call for a different approach as they spring with merely novel facets: they are very competitive (Andrei et al., 2017a, 2017b; Gazzola et al., 2017); they are dynamic and highly innovative (Maher et al., 2016); they are two-sided: both individuals and suppliers can use them to search for information, respectively for promoting their products; they offer access to big data about their subscribers and they can reduce costs as online environments give way to increasingly more and more transactions rather than the offline stores (Maher et al., 2016). For instance, according to Statista's Digital Market Outlook (2018), e-commerce revenue in Europe is expected to increase from approximately 282 billion U.S. dollars in 2016 to approximately 430 billion in 2021.

Rapidly, digital technologies are recrafting the extant markets (OECD, 2009), with an immediate expression of "always open", prone to respond quickly and provide information suitable for different types of users. In this front, OECD (2016) underlines the key developments brought forward by the massive digitalization of economy, respectively: non-monetary transactions (i.e., consumers acquire "free" goods and services, at the exchange personal data on preferences, motivations and expectations), digital content (i.e., technical specifications sometimes prevent consumers from understanding their rights and obligations), active consumers (i.e., consumer-to-consumer transactions often account for the success or failure of a line of products and/or services), mobile devices (i.e., how information is presented and accessed is essential, the accent placed on design), security risks and payment protection (i.e., consumers data require dedicated awareness, safety

mechanisms, and special regulations), unsafe products (i.e., the online environment is very permeable to unsafe/forbidden products and, thus, needs close supervision).

All these factors along with the digitization of products and processes have deeply changed the behavior and expectations of consumers (Halttunen, 2016), in the sense that they are now having much more possibilities to gather information regarding their planned purchases, to endorse, to recommend, to connect with peer consumers, etc. (Miklošík, 2015, p. 167). In what concerns the demand-side, consumers are now able to compare benefits and prices with unprecedented ease and accuracy (Thompson, 2003; Vătămănescu, Nistoreanu and Mitan, 2017). This leads to consumer empowerment which is not only dependent on confidence and knowledge, but also implies the openness and intention to play an active consumer role (Espejo and Dominici, 2017). As stated by the European Union (2011, p. 2), the "empowered consumers make optimal decisions by understanding their own preferences and the choices available to them".

In order to make optimal decisions, consumers often resort to shortcuts, the online environment providing them with less time-consuming undertakings: the ability to compare prices, to look for the best offer, to check online the sales and promotions, establish the quality-price ratio (European Union, 2011; Gazzola et al., 2017; Vătămănescu, Nistoreanu and Mitan, 2017). Researches have demonstrated that, in digital markets, consumers "often value quality and product features over low prices" (Maher et al., 2016, p. 2). Another characteristic of online consumers, especially for the young generation, is the preoccupation for sustainable consumption and products: they are taking into account the CO2 footprint, the pollution or health effects, the origins of the products (Sogari et al., 2017), but also "the impacts which that consumption may have on the factors of production, including workers and resources" (OECD, 2009, p. 7)

For a growing number of consumers, the actual consumption has set itself up as a "way of expressing status and identity" (Dominici et al., 2017) and many online consumers are paying attention to their peers' opinions on various products (OECD, 2008, 2009). There are also differences when it comes to age – old vs. young consumers – Baby Boomers, Millennials and Gen Z are acting differently in the online communities (Dabija et al., 2017; Dabija et al., 2018) and gender (women are more likely to buy sustainable products: eco-labeled products or organic food; they write reviews and they are responsible for 80% of the acquisitions within a family; on the other side, men are buying less articles, but the more expensive ones: homes, cars and electronics) (OECD, 2008).

Furthermore, the new generation of consumers – the Millennials – is looking for "sustainable products, not just socially responsible companies" and they are loyal to brands they can personally use to live sustainable lives (Mahler, 2016). Here, the Euromonitor International's (2017) Global Consumer Trends Survey found that 53% of all respondents thought they can "make a difference to the world through their choices and actions". They are looking for the greater good and they would choose to work and buy from o company which is eco-friendly and more responsible (Hobart and Sendeck, 2016), they will be seeking for products that are sustainable and long-lasting (Vătămănescu, Nistoreanu and Mitan, 2017; Lakatos et al., 2018).

Given the lack of perceived boundaries, consumers are liable to explore and cement this tendency towards sustainable processes and outcomes via online communities as they often prefer to interact online in order to test their buying assumptions (Zhao et al., 2013; Bharati

et al., 2015), to read and write reviews, to influence other consumers' choices worldwide. In the XXIst century, new consumer expectations and demands emerge and deploy, influencing both the business orientation and the consumption patterns.

1.2. The rise of the online intellectual capital within consumer-based online communities

The massive and substantial digitalization of markets and the knowledge-based bioeconomy have turned the attention of many organizations from the functional production models to more flexible, creative and innovative ones, adapted so as to meet the expectations of the digital consumer. This is even more imperative when considering that these exigencies have been acknowledged not only by the business sector, but by the European institutions equally, in the context of bioeconomy strategies (European Commission, 2017). For example, the report on food systems approaches for 2030 comprises explicit references to online forums "hosting a facility for questions, networking and exchange on more sustainable production and consumption" (p. 5), to online platforms allowing "communities to get involved with the redistribution of food (…) to create 'bridges' and build on the collaborative potential of ICT networks" (p. 7). As a clear recommendation, the report posits that "In creating 'online bridges' between citizens, organizations and stakeholders, digital technologies may form the basis for some elements of future food-sharing systems" (European Commission, 2017, p. 4).

Going beyond context-driven approaches, it has become obvious that digital consumers get increasingly empowered through constant exchange of knowledge and acumen with similar peers within consumer-based online communities (Vătămănescu, Nistoreanu and Mitan, 2017). Hence, new forms of intellectual capital (IC) flourish and widely affirm their relevance in the context of the digital economy.

Despite lack of consensus over a generally accepted definition, the intellectual capital could be defined and operationalized as a dynamic assemblage of knowledge and knowing capabilities acquired, harnessed, leveraged, transferred, exchanged, diffused, converted, etc. able to generate a wide spectrum of competitive advantages in various fields (Subramaniam and Youndt, 2005; Bratianu, 2009; Vătămănescu et al., 2015, 2016). At this level, three main components of the IC have been consistently summarized by the extant body of literature, namely the human capital, structural capital and relational capital (Dean and Kretschmer, 2007; Sharabati et al., 2010; Herremans et al., 2011; Leitner et al., 2014). All these IC components are interrelated and linked (Still et al., 2013) as human capital does not exist isolated, but in interactive relationships, while the relational capital can manifest itself because people, possessing knowledge, skills, experience and attitude interact with others.

The great majority of studies in the field of IC underscored the organization-centric approach on the IC components, still some recent papers have availed a digital-based framework for the overall discussion (Vătămănescu et al., 2015; Vătămănescu et al., 2016; Vătămănescu, Andrei and Pînzaru, 2018). A brand-new construct was coined, namely the "network–based intellectual capital" defined as "an intricate configuration and consistent interaction among people, knowledge, information, expertise, competences, know-how within complex and dynamic online social networks" (Vătămănescu et al., 2016, p. 596). Giving credit to the study conducted by Vătămănescu et al. (2016), the "network–based intellectual capital" is genuinely illustrative of the relationship between the three dimensions of IC (i.e., human, structural and relational) and the digitalization dynamics. Its scope goes beyond the organizational borders

and adopts the reality of new online social aggregations of individuals who affiliate to different online (web) communities of interest, practice, etc.

By embracing the framework of new "network capabilities" (Still, 2014), online communities are aggregations of individuals who share common interests, practices, hobbies, experiences, communicating and interacting primarily over the Internet. These affiliations bring together people, knowledge, information, ideas and opinions and they contribute to learning, development and collaboration (Soto-Acosta et al., 2014). As a specific facet of these aggregations, the consumer-based online communities are moulded round product or brand-related issues, gathering people with similar consumption interests, preferences and behaviors (Cheung et al., 2008; Brodie et al., 2013; Wirtz et al., 2013).

In this vein, the online human capital comes forward as individual-embodied knowledge, education, creativity, empowerment, experience, skills, agility, motivations, attitudes, behaviours, etc. (Tovstiga and Tulugurova, 2007; Cricelli et al., 2014; Vătămănescu et al., 2016). The accumulation of online human capital is only the first step in the process of community formation and development. Progressively, its members develop a sense of familiarity and social interconnectedness, by converging towards a shared purpose and interest and by actively contributing to creating trust and strong bonds within the community (Forman et al., 2008).

The consumer-based online communities favour communication, information sharing and "enables consumers to gather, compare, review and share information about goods and services, and fosters the development of new business models, some of which facilitate consumer-to-consumer transactions" (OECD, 2016, p. 8) As a result, new forms of online intellectual capital emerge, that is, the online structural capital (product-related storehouses of knowledge comprising reviews, comments, analyses, images and pictures, stories, specific experiences, etc.), respectively, the online relational capital (referring to consistent communication and interaction flows, networking, exchanges, etc.) (Vătămănescu et al., 2016).

From the consumer-based online communities perspective, all the IC components objectivize themselves via two important aspects: a message source (the initiator of the message, also known as the reviewer) with all the inherent characteristics (social, geographical, ethical, etc.) and the message content (what the initiator is writing, namely the review) which may have a positive or negative valence (Forman et al., 2008; Zhao et al., 2013). Both aspects are connected and important: the former for creating the bonds and the affiliation feelings presented above (as an objectivization of the online relational capital) and the latter as a content "manifesto" (an objectivization of the online structural capital) directly influencing online sales and purchasing decisions.

In this respect, studies showed that the reviews coming from community members with similar characteristics are more likely to be considered when buying (Forman et al., 2008) and, when it comes to buying experiential products (like books, movies and music) – the other members' reviews are valued more than the own personal experience of the reader (Zhao et al., 2013). The new generation of consumers considers feedback as an important tool, so they find useful to provide feedback about products and services, to write reviews about their experiences with the brand and its deliverables and they consider this a "social duty" (Hobart and Sendeck, 2016) as members of specialized online communities. Therefore, given the fact the information is now available and very easy to access online, consumers may integrate multiple sources of information when making their decisions.

2. Methodology

Starting from the theoretical aspects previously depicted, the current research aims to investigate the influences of the intellectual capital – as generated by a highly-digital environment – on the consumption of bio products. In this respect, three main research objectives were established: O1. to examine the relationship between digitalization and the development of the online intellectual capital; O2. to analyze the relationship between the online intellectual capital and the consumption of bio products (understood as an incentive of the bioeconomy from the demand side); O3. to appraise the relationships between digitalization and the consumption of bio products by means of the three components of the intellectual capital, namely human capital, structural capital and relational capital.

Based on these research objectives, 7 hypotheses were formulated, that is:

- H1: Digitalization has a significant influence on the development of online human capital.
- H2: Digitalization has a significant influence on the development of online structural capital.
- H3: Digitalization has a significant influence on the development of online relational capital.
- H4: The online human capital has a significant influence on the consumption of bio products.
- H5: The online structural capital has a significant influence on the consumption of bio products.
- H6: The online relational capital has a significant influence on the consumption of bio products.
- H7: Digitalization has a significant influence on the consumption of bio products by means of the online intellectual capital.

The research hypotheses were tested via a questionnaire applied to a sample of 708 online consumers (aged between 19 and 39, M=22.96, SD=5.2) from two European countries, namely Romania and Italy. The selection of the two countries was a result of convenience sampling supported by a partnership between two universities and the availability of the targeted subjects. The questionnaire was distributed online between 2 and 28 November 2017. In its final form, the research instrument comprised 27 items measuring five constructs, as follows: 1. Digitalization (understood as the highly-digital environment favored by the online space) comprises three items referring to the intensification of various online flows in today's economy; 2. Online human capital (understood as the development of online communities consisting of empowered consumers) contains eight items; 3. Online structural capital (understood as the generation of content by empowered consumers) includes two items; 4. Online relational capital (understood as the development of communication and interaction flows among empowered consumers) comprises three items; 5. Consumption of bio products (understood as an incentive of bioeconomy from the demand side) consists of four items referring to the online consumers' buying patterns. All the multi-item constructs were measured on a five-point Likert scale where 1 = Strongly disagree and 5 = Strongly agree. Along with the items falling into the five constructs, the questionnaire also included socio-demographic items (gender, age, residence, education level, income).

In order to properly process the data and to analyze the formulated hypotheses, a partial least squares equation modeling technique (PLS-SEM) was employed via SmartPLS version 3 software (Ringle, Wende and Becker, 2015). The choice for a variance-based technique was supported by its wide usage for explorative undertakings in the framework of social sciences.

3. Results and discussion

3.1. Measurement model assessment

The assessment of the measurement model encompassed the examination of three main quality criteria: the factor loadings, convergent validity and discriminant validity in line with the recommendations of the specialized body of literature (for convergent validity – Barclay, Higgins and Thompson, 1995; Yi and Davis, 2003; Henseler, Ringle and Sinkovics, 2009; for discriminant validity – Fornell and Larcker, 1981; Henseler, Ringle and Sarstedt, 2015).

In the first step of the analysis, the properties of the constructs were computed in order to scrutinize the values for convergent validity, as shown in table no. 1.

Table no. 1: Psychometric properties of constructs

Construct	Composite Reliability (CR)	Average Variance Extracted (AVE)	Indicator	Mean	Standard deviation	Factor loadings
Digitalization (Reflective)	0.849	0.653	DIGITAL4	3.23	0.95	0.764
			DIGITAL5	3.24	0.97	0.833
			DIGITAL6	3.37	0.94	0.825
Online Human Capital (Reflective)	0.910	0.560	HC4	3.37	0.91	0.731
			HC5	3.38	0.90	0.758
			HC7	2.97	0.94	0.730
			HC8	3.02	0.99	0.801
			HC9	3.43	0.94	0.779
			HC10	3.11	0.96	0.692
			HC11	3.11	0.92	0.746
			HC12	3.16	1.02	0.745
Online Relational Capital (Reflective)	0.775	0.536	RC1	2.55	1.05	0.679
			RC3	2.96	1.11	0.792
			RC4	3.04	1.17	0.720
Structural Relational Capital (Reflective)	0.815	0.687	SC3	4.11	0.89	0.821
			SC4	3.65	0.97	0.837
Consumption of Bio Products (Reflective)	0.855	0.597	BIO1	3.28	1.19	0.784
			BIO2	3.33	1.15	0.836
			BIO3	3.25	1.12	0.736
			BIO4	2.77	1.10	0.729

Source: Authors' own elaboration based on the PLS-SEM results

As observed in table above, the recommended thresholds for all the psychometric properties are complied with, respectively CR > 0.7, AVE > 0.5 and factor loadings > 0.65.

The second step of the analysis included the assessment of the discriminant validity in accordance with Fornell and Larcker's (1981) criterion – all the square root of AVE (diagonal entries) have higher values than the construct correlations (non-diagonal entries), as illustrated in table no 2.

Table no. 2: Square Root of AVE and Latent Variable Correlation

	Consumption of Bio Products	Digitalization	Online Human Capital	Online Relational Capital	Online Structural Capital
Consumption of Bio Products	0.772				
Digitalization	0.322	0.808			
Online Human Capital	0.322	0.318	0.748		
Online Relational Capital	0.520	0.474	0.326	0.732	
Online Structural Capital	0.153	0.146	0.170	0.187	0.829

Source: Authors' own elaboration based on the PLS-SEM results

The discriminant validity was also evaluated in relation to the Heterotrait-Monotrait Ratio (HTMT), all values ranging between 0.239 and 0.758, thus below the recommend threshold of 1 (Henseler, Ringle and Sarstedt, 2015).

The third step of the measurement model assessment consisted of the examination of the variance inflation factor (VIF) outputs on purpose to detect potential issues in terms of multicollinearity among the five constructs considered in the model. In line with Diamantopoulos and Siguaw's (2006) requirements, all the VIF values were covered by the array from 1.163 and 2.916, thus lower than 3.3.

3.2. Structural model assessment

Given that the basic requirements for the measurement model assessment were complied with, the analysis stepped forward to the evaluation of the structural relationships in the model. As depicted in the figure below (figure no. 1), the model accounts for almost 30% of the variance in Consumption of Bio Products (as the R square value illustrates).

In line with Hair et al.'s (2014), the structural model was assessed by means of the computation of R^2, beta, T statistics and P values using a bootstrapping procedure with 5000 resamples. The corresponding results and the decisions on hypotheses testing are presented in table no. 3.

As previously summarized, six out of the seven hypotheses were supported in the context of the current research. In this respect, the investigation revealed that digitalization has significant positive influences on the development of online human capital ($\beta = 0.318$, $p < 0.001$), structural capital ($\beta = 0.146$, $p < 0.01$) and online relational capital ($\beta = 0.474$, $p < 0.001$). These findings are consistent with prior research (Still, 2014; Vătămănescu et al., 2015, 2016; European Commission, 2017) stating the impact of digital transformations on the advent of new online forms of aggregations, comprising consumers with similar

interests and goals, preferences and expectations who interact on a regular basis. The consumer-based online communities set themselves up as an agora for their empowered members who objectivize their opinions, attitudes, behaviors, overall knowledge and experience by means of product-related or brand-related comments, reviews, storytelling, shared expertise. As shown in table no. 3, the highest influence pertains to the online relational capital, a fact which implies that digitalization has prevailingly encouraged constant flows of communication and interaction among the members of the online communities regarding bio products. These results validate the premise advanced by Pyka (2017) according to which digitalization – promoted and supported via the Digital Agenda for Europe – contributes both directly and indirectly to the debate on hot societal and economic issues and, implicitly, to the development of the inherent conditions for the formation of online communities based on common interests. Consequently, the implications of this strategy are not only seen by means of the single digital market, but also by means of the social dimension which brings to the fore new forms of collaboration and coordinated action.

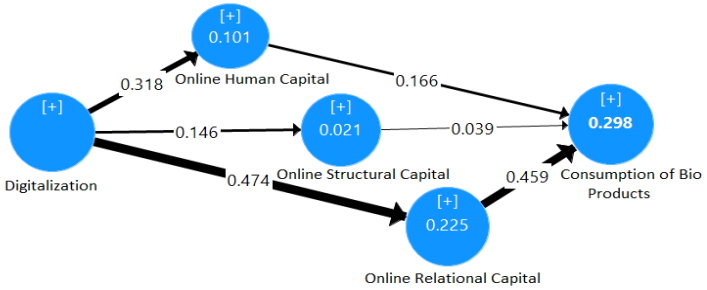

Figure no. 1: PLS test of the proposed structural model

Source: Authors' own elaboration based on the PLS-SEM software

Table no. 3: Results of the structural model analysis (hypotheses testing)

Relationship (Hypothesis)	Standard Beta	Standard Deviation	T Statistics	P Values	Decision
Digitalization → Online Human Capital (H1)	0.318	0.038	8.327	0.000	Supported
Digitalization → Online Structural Capital (H2)	0.146	0.042	3.469	0.001	Supported
Digitalization → Online Relational Capital (H3)	0.474	0.030	15.686	0.000	Supported
Online Human Capital → Consumption of Bio Products (H4)	0.166	0.043	3.839	0.000	Supported
Online Structural Capital → Consumption of Bio Products (H5)	0.039	0.037	1.058	0.290	Not supported
Online Relational Capital → Consumption of Bio Products (H6)	0.459	0.039	11.874	0.000	Supported
Digitalization → Consumption of Bio Products (Indirect Effect) (H7)	0.276	0.024	11.274	0.000	Supported

Source: Authors' own elaboration based on the PLS-SEM results

In what concerns the influences of the three forms of the online intellectual capital on the consumption of bio products, the results highlighted two significant positive relationships between the online human capital and the consumption of bio products ($\beta = 0.166$, $p < 0.001$) and the online relational capital and the consumption of bio products ($\beta = 0.459$, $p < 0.001$), the latter retrieving the highest value among the path coefficients. The findings confirm the fact the evidence brought by Zhao et al. (2013) and Bharati et al. (2015), but fall short to account for the relationship between the online structural capital and the consumption of bio products ($p > 0.05$) in the context of the current research. Nevertheless, the indirect effect of digitalization on the consumption of bio products proved significant and positive ($\beta = 0.276$, $p < 0.001$), thus supporting the impact of the digital economy from the demand-side standpoint. The results confirm the initial assumptions of the study in that the emergence of new forms of intellectual capital reconfigures the logic of the digital economy and supports the consolidation of knowledge-based consumption trends and of informed consumers. Moreover, the interest and consistent orientation of the online communities' members towards the consumption of bio products stand for a compelling catalyst for the bioeconomic model within today's macroeconomic context, by acknowledging the significant influence of the stakeholders.

Given the fact that the research sample included subjects from two different European countries (i.e., Romania and Italy), a multi-group analysis was performed in accordance with the recommendations of Sarstedt et al. (2011). This analysis allowed to examine whether there were statistically significant differences between the online consumers in the sample in relation to their country residence, as presented in table no. 4.

Table no. 4: PLS-MGA results

Relationships	Path Coefficients-diff (|Country(1.0) – Country(2.0)|)	p-Value(Country(1.0) vs Country(2.0))
Digitalization → Online Human Capital	0.172	0.981
Digitalization → Online Structural Capital	0.080	0.794
Digitalization → Online Relational Capital	0.113	0.959
Online Human Capital → Consumption of Bio Products	0.086	0.145
Online Structural Capital → Consumption of Bio Products	0.061	0.787
Online Relational Capital → Consumption of Bio Products	0.097	0.894

Source: Authors' own elaboration based on the PLS-SEM results

At this level, the analysis indicated that the differences between the two groups – i.e., Romanian subjects versus Italian subjects – are not meaningful ($p > 0.05$). In this way, evidence is brought that the validation of the inferred relationships is not only country-specific, going beyond national delimitations.

Conclusions

Approaching bioeconomy from a demand-side perspective, the present paper discussed the effects of digitalization on the emergence and development of new forms of intellectual capital, objectivized within consumer-based online communities, and the effects of the latter on the consumption of bio products. In this vein, the active role of the online consumers was brought to the fore, with a special emphasis on the new generation of empowered consumers who cement knowledge-based consumption patterns.

In their search for bio products, online consumers share their expectations and preferences, their experience and expertise with similar peers, unfolding consistent knowledge exchanges. In this way, they acquire and transmit relevant knowledge on sustainable, bio-labeled products, steadily supporting the transition to a new economic model, to a novel approach on market dynamics and consumption patterns. Here, even though the paper brings forward the importance of the large-scale consumption of bio products – understood as an incentive for the bioeconomic model from the demand side – a first research limit refers to the lack of examination of the economic sectors which produce, handle and exploit bio resources. Further research focused on the analysis of the offer of bio products would round off the frame of reference and would enrich the multifield landscape of bioeconomy.

The research included a sample comprising subjects from two European countries (i.e., Romania and Italy), the findings showing no statistically significant differences between the structural models applicable to country-specific contexts. In this vein, a second research limit is objectivized, given the convenience sampling and the structure of the sample itself which consists of subjects with an average age of 22 years. Future research would benefit from extending the study on samples from other European states and on other age categories in order to test potential cleavages.

Acknowledgement: *This work was supported by a grant of Ministry of Research and Innovation, CNCS – UEFISCDI, project number PN-III-P1-1.1-TE-2016-0232, within PNCDI III.*

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