Decision (March 2023) 50(1):35–49
https://doi.org/10.1007/s40622-023-00336-1

RESEARCH ARTICLE

Managerial decisions and new product development in the circular economy model enterprise: absorptive capacity and a mediating role of strategic orientation

Monika Stelmaszczyk · Agata Pierscieniak · Denisa Abrudan

Accepted: 2 February 2023 / Published online: 28 February 2023

Abstract The study explains the flow of knowledge in the circular economy model enterprises. We analyze the impact of managerial decisions on the absorptive capacity, which is new product development, considering the role of critical elements of strategic orientation (innovation and costs) in the textile industry. Based on the verification of hypotheses by employing the SEM method, innovation orientation is a mediator between adaptability-oriented decisions and transformation, and between adaptability-oriented decisions and exploitation. Ambidexterity-oriented decisions affect absorptive capacity. These findings semanticize and extend previous research, indicating that strategic activities focused on eco-innovations are transformed into the process of creating a new product.

M. Stelmaszczyk (✉)
Jan Kochanovski University, Stefana Żeromskiego 5, 25-369 Kielce, Poland
e-mail: m.stelmaszczyk@ujk.edu.pl

A. Pierscieniak
Warsaw University of Technology, Pl. Politechniki 1, 00-661 Warsaw, Poland
e-mail: agata.pierscieniak@gmail.com

D. Abrudan
West University of Timisoara, J.H. Pestalozzi 16, 300115 Timisoara, Hungary
e-mail: denisa.abrudan@e-uvt.ro

Keywords Managerial decisions · Ambidexterity · Absorptive capacity · Product development · Circular economy · Structural equation modeling

JEL Classification D81 · D83 · O32 · Q56

Introduction

Circular economy (CE) is a relatively new concept. From the point of view of economic sciences, it is treated as an economic system, while such concepts are named by Chizaryfard et al. (2020) as a systemic change in companies and industries. Contemporary researchers point in their review articles to many networks of topical topics appearing in publications, such as business models, circular economy, circular business models, value, supply chain, transformation, resources, waste, and reuse (Ferasso et al. 2020; Alcayaga et al. 2019).

Management process in the CE model enterprise is analyzed rarely (Ferasso et al. 2020), mainly from the perspective of waste management (Hidalgo et al. 2019; Spišáková et al. 2022); sustainable strategic management (Grzebyk and Stec 2015; Takacs et al. 2022); supply chain management (Kazancoglu et al. 2020; Geissdoerfer et al. 2018); or environmental innovation (Prieto-Sandoval et al. 2019; Krawczyk-Sokolowska et al. 2021). Research connected with innovations shows that innovation is a crucial

component of a circular business model in at least seven primary areas (Suchek et al. 2021), such as strategic alliances and a multi-tiered approach (e.g., Rajala et al. 2018); business model innovations (Ghadimi et al. 2020); eco-innovations (Jakhar et al. 2019); dynamic possibilities (Ramakrishna et al. 2020); technology; transition to CE (e.g., Järvenpää et al. 2020); and CE in the biological cycle (e.g., Ladu et al. 2020).

The prerequisite for introducing innovations to an organization is its absorptive capacity (Gebauer et al. 2012; Lane et al. 2006). Cohen and Levinthal (1990, 128) defined absorptive capacity as "the company's ability to recognize valuable new external information, assimilate it, and use it for commercial purposes". In this research, we propose its analysis from the perspective of the four dimensions of acquisition, assimilation, transformation and exploitation (Zahra and George 2002, 185–203), which fully describe the pattern for processing outside knowledge into activities related to the functioning of an enterprise in the CE model. As the formulated strategies must be consciously implemented by top managers to enable better results (Dess 1987), we assume that the suggested positive impact of ambidexterity-oriented decisions on absorptive capacity depends on their strategic orientation. The consequence of implementing external knowledge for processes in the CE model is an action aimed not only at maintaining a closed loop of raw materials used in the production but, above all, at creating and introducing a new environmentally friendly product to the market.

Innovation implementation in enterprise is preceded by management's decision-making processes, whose consequence is a new product development (Elenkov and Manev 2005; Kleinschmidt et al. 2007). Analyses undertaken in related subject literature, however, show that decisions are made in the context of ambidexterity (Fondas and Wiersema 1997). This context is taken into account in the current study, assuming that "in the perspective of adaptability-oriented decisions", it determines the extent and effectiveness to which a firm adapts to changes in the environment, while alignment-oriented decisions specify how efficiently internal activities can be aligned to support the overall objective of the firm (Gibson and Birkinshaw 2004; Kortmann 2015, 667). We propose to combine the adaptability-oriented decisions context with innovations which, as previously shown, are the main components of strategic orientation of companies operating based on the CE model. We propose to combine the alignment-oriented decisions context with costs, which in the CE model are an important constituent that must be taken into account in operational activities.

Each company, including those operating in the CE model, has strategic orientation, which is a complex construct (Bhuian et al. 2005) that fosters a better understanding of the organization's behavior. Taking this premise into account in the analysis of enterprises operating on the basis of the CE model, introduction of the second component of strategic orientation, adequate to exploitative innovation behaviors, namely cost orientation (Chen et al. 2010; Olson et al. 2005), appears to be intended. In analyzing the context of alignment-oriented decisions, we agree with Kortmann (2015), and propose to combine it with costs, which in enterprises based on the CE model are important at the operational level, because such enterprises, like any other, must be competitive and profitable.

In light of the assumptions presented, our goal is to analyze the impact of managerial decisions on the absorptive capacity, which results in new product development, taking into account the role of key elements of strategic orientation (innovation and costs) in an enterprise operating in the CE model. To confirm our considerations, we conducted empirical research at VIVE Textile Recycling Ltd., which operates in the CE business model in the textile industry. Based on data obtained from 138 representatives of the managerial staff, we analyze the impact of innovation orientation and cost orientation on the relationship between ambidexterity orientation decisions and absorptive capacity.

Our research broadens the existing knowledge on the positive impact of management staff on innovation (through the implemented strategic orientation) and its performance (new product development) by including the ambidexterity perspective (Cooper and Kleinschmidt 1995; Elenkov and Manev 2005; Kleinschmidt et al. 2007; Li 2014). The analysis of the indicated dependencies in a company from the textile industry, operating in the CE model, where knowledge and managerial decisions are focused on activities related to environmental protection in the process of new product development is a novelty.

Secondly, this study contributes to ambidexterity literature by integrating strategic process theory. In particular, it was established that managerial decisions in terms of ambidexterity and the perspective of a two-element strategic orientation (innovation and costs) in a textile company operating in the CE model are antecedents of absorptive capacity, which transforms the newly acquired knowledge into the process of building a new product.

Theoretical background and hypotheses development

Ambidexterity-oriented decisions and absorptive capacity

According to the theory of strategic processes, every organization, including the one representing the circular economy model, operates in two areas: strategy formulation and its implementation (Bourgeois and Brodwin 1984). The logic of such actions is identified by the concept of ambidexterity, which indicates the key role of top management, who, due to their position are "able to balance adaptability and alignment-oriented decisions, can implement ambidextrous organizational behavior, and thus, sustainable competitive advantage, is to be achieved" (O'Reilly and Tushman 2004, 81). Identification of managerial decisions from the perspective of ambidexterity allows one to capture "capability of top management teams to manage contradictory strategic directions, namely adaptability and alignment" (Kortmann 2015, 667). The distinction between two types of decisions made from the perspective of different organizational contexts allows for full identification of the decision-making process essential for the proper functioning of enterprises.

Ambidexterity-oriented decisions ensure continuity of resources in the organization (Smith et al. 2010). From the perspective of companies operating in the CE model, one of the most important resources is external knowledge that allows for the acquisition and implementation of innovations. These processes can occur thanks to the absorptive capacity (AC), which is treated in the literature as a complex variable. Zahra and George (2002) and Jansen et al. (2005) conceptualize the sequence as a linear relationship between acquisition, assimilation, transformation, and exploitation, whereas Todorova and Durisin (2007) interpret assimilation and transformation as two parallel elements. In considerations herein, we adopt the concept of absorptive capacity by Zahra and George (2002). We assume, similarly as Kortmann (2015), that ambidexterity-oriented decisions act as antecedents of phenomena occurring at the organizational level (Kortmann 2015). We also assume that ambidexterity and absorptive capacity play a leading role in shaping business models (Kranz et al. 2016). We want to check whether the relationship between ambidexterity-oriented decisions and absorptive capacity functions in practice in an enterprise operating in the CE model.

H_1 There is a positive relationship between ambidexterity-oriented decisions and absorptive capacity.

Strategic orientations in the context of ambidexterity-oriented decisions and absorptive capacity

Strategic orientation is one of the key variables in strategic management. Some researches see it as a representation of an organization's adaptive culture which steers its interaction with its environment (Noble et al. 2002), while others see it as "principles that direct and influence the activities of a firm and generate the behaviors intended to ensure its viability and performance" (Gatignon and Xuereb 1997; Hakala 2011, 199). In the literature, strategic orientation is analyzed from various perspectives. Some authors distinguish three (Deutscher et al. 2016), and others, four main strategic orientations (Hakala 2011). The main research approach that relates with market orientation is considered an important element of the company's success and results, related in particular to the needs and value for the client (Cano et al. 2004; Grinstein 2008; Hunt and Lambe 2000; Kirca et al. 2005; Shoham et al. 2005). Another research approach is the entrepreneurship orientation, which reflects a wide spectrum of activity, from the degree of risk-taking, company proactivity and innovation (Covin and Slevin 1989; Lumpkin and Dess 1996) to adaptation, i.e., better adaptation to the environment (Hult et al. 2004; Wiklund and Shepherd 2005). Innovation is one of the key elements in the first three strategic orientations, i.e., market, entrepreneurial and adaptive

orientations. It is important because of competitiveness and adaptability (Gatignon and Xuereb 1997). In the literature on the subject, the concept of learning orientation can also be indicated. It is perceived as the propensity of an organization to learn, not only as a commitment to science, but also as a process of acquiring new technologies, products or processes (Sinkula et al. 1997; Huber 1991; Calantone et al. 2002).

When analyzing the strategies of companies operating in the CE model, it can be noticed that innovation is a key element of these strategies (Konietzko et al. 2020; Awan et al. 2021). Other researchers point to additional elements such as environmental impact, resource scarcity and economic benefits (Ellen MacArthur Foundation 2013). In practice, this translates into "maintaining the highest level of economic value of products, components and materials while ensuring that their environmental impact is minimal over time" (Balkenende et al. 2017, 1–19). From these perspectives, two basic components of strategic orientation of companies operating in the CE model emerge, namely, innovation orientation and cost orientation. Innovation orientation guides the company's strategy, knowledge acquisition and functional interaction toward creating innovation (Siguaw et al. 2006). Innovation orientation is defined as "openness to new ideas as an aspect of the company's culture" (Hurley and Hult 1998, 44), which develops and renews competitive advantage by creating and implementing innovations (Olson et al. 2005, 52). However, companies that overemphasize innovation orientation may lose sight of the costs associated with innovation, thus compromising efficiency (Simpson et al. 2006, 1138). Therefore, a sustainable approach to innovation requires additional attention for costs from managers, which increases efficiency in all parts of the value chain and supports the use of existing positions in the product market (Caerteling et al. 2011; Olson et al. 2005). We assume that both elements of strategic orientation are supported by ambidexterity-oriented decisions.

H_2 There is a positive relationship between ambidexterity-oriented decisions and both innovation orientation (H_{2A}) and cost orientation (H_{2B})

Creating innovation requires knowledge that the company absorbs from the environment. The literature confirms the influence of absorptive capacity on innovation (Liao et al 2007; Chen et al. 2009). In companies operating in the CE model, external knowledge is important not only in the context of new technologies but also sustainable development trends (Dzhengiz and Niesten 2020). The research shows that "a contextualized process model of absorptive capacity in explaining the unique challenges in circular product innovation" (Schmitt and Hansen 2018).

By analyzing the relationship, we attempt to indicate that absorptive capacity benefits from innovation orientation in enterprises with the CE model. It is related to the consideration of openness to new ideas, innovative approaches to a product, process or technology in all phases of absorptive capacity. Cost orientation can influence the absorption of knowledge through innovation orientation, which is important at the strategic level. This is justified because the focus on innovation in strategic terms should be balanced with operational efficiency (Boyd and Salamin 2001; Kortmann 2015).

H_3 There is a positive relationship between both innovation orientation (H_{3A}), cost orientation (H_{3B}) and absorptive capacity

The subject of innovation is, in respect of the business activity, identified in the literature as the concept of new product development (NPD). It is analyzed as a process whose model captures the relevant stages that emphasize the use of innovation (Griffin and Page 1993; Molina-Castillo and Munuera-Aleman 2009) or is understood as a knowledge-intensive activity (Nonaka and Takeuchi 1995; Pisano and Wheelwright 1995). The research results show that knowledge integration and innovation exert significant positive effects on new product performance (Yang 2005; Iamratanakul et al. 2008).

In the CE concept, the meaning of "new product development" (NPD) is relative to its impact on the environment. The process of creating a new product model in a circular economy requires changing the set of rules, strategies and adapting methods (Hollander et al. 2017; Pinheiro et al. 2019).

Literature research confirms that innovation orientation is an important element influencing the development of a new product (Veryzer 1998; Zhang and Duan 2010). In line with considerations herein, we assume that NPD is influenced by both dimensions of strategic orientation, identified for the purposes of the

analyses. Developing NPD at the strategic level involves innovation orientation relative to adaptability-oriented decisions (Lester 1998). This phenomenon concerns incremental innovations that improve existing product-market positions (Danneels 2002; Jansen et al. 2006). At the operational level, NPDs shape costs that can limit innovative ideas while maintaining operational efficiency (Olson et al. 2005).

H_4 There is a positive relationship between both innovation orientation (H_{3A}), cost orientation (H_{3B}) and new product development.

Sample and data collection

The adopted research objective determined the choice of the research object. A circular economy-oriented enterprise was required to determine the impact of managerial decisions and strategic orientation on the ability to absorb knowledge on the elimination of generated waste. This circular economy model is not yet widespread in Poland, and it isn't easy to find a sufficiently large sample of companies that the experience and maturity of the analyzed phenomenon would characterize. Solving this difficulty related to the credibility of the research, we decided to verify our model at VIVE Textile Recycling Ltd. It is a Polish company that strives to maximize the use of waste by recycling (textiles and second-hand clothes) in four areas: second-hand clothing stores, composite textile production, production of alternative fuel and industrial wipers. VIVE Textile Recycling Ltd. is a leader in the recycling of textiles and used clothing in Poland. Its products are exported to many countries in Europe, Africa, Asia, as well as North and South America. The choice of this company as a research subject with unique characteristics is justified from the perspective of achieving the aim of the article and the adopted research assumptions (Ariño and Ring 2010).

Quantitative research was used to verify the existing theory by testing the hypotheses. The use of this type of research in the analyzed case study is justified due to the context of the analysis (Byrne and Ragin 2009) and the formulated research model (Tight 2017), the purpose of which is to identify the relationships between the analyzed variables.

We collected the data using the Paper and Pen Personal Interview method (PAPI). The research tool was a questionnaire. We measured variables using a seven-point Likert scale with a neutral middle value. We assigned responses numerical values from one (strongly disagree) to seven (strongly agree).

The invitation to the survey was sent to all directors and managers of VIVE Textile Recycling Ltd. The group of respondents was made up of 138 persons. Ultimately, 78 observations were included in the statistical data analysis. The response rate was 57%. The sample of 78 respondents consisted of 44% women and 34% men. 56.4% of the respondents were between 26 and 40 years of age. 38.4% of people were between 41 and 50 years of age. Others were younger than 25 (2%) or older than 50 (2%). The most numerous group of respondents (43%) on the day of the survey had been holding managerial positions at VIVE Textile Recycling Ltd., for no longer than two years. More than one-third of the respondents (36%) were people who had been in management positions for 3–5 years. The other directors and managers had been working at VIVE Textile Recycling Ltd. for over 6 years (including only 4 people over 12 years). Additionally, almost 70% of the respondents had higher education.

We adopted the following operational definitions of the variables included in the study. Absorptive capacity is ability to acquire, assimilate, transform, and exploit external knowledge (Zahra and George 2002, 185–203; Todorova and Durisin 2007, 774–786; Stelmaszczyk 2020, 18). We define the new product development (NPD) as bringing a new product to marketplace (Wei et al. 2014, 832–847). Managerial decisions are the ability of enterprise management to make adaptability-oriented decisions and alignment-oriented decisions (Gibson and Birkinshaw 2004, pp. 209–226; Kortmann 2015, 671; Stelmaszczyk 2020, 247). Strategic orientation consists of two elements: innovation orientation and cost orientation (Kortmann 2015, 666–684).

We used existing scales to measure each of the variables. They are used by a large number of researchers conducting empirical research in various types of organizations around the world. These scales are therefore considered to be fully adequate for measuring the variables that we included in the research model. We measured the enterprise's absorptive capacity using a 14-item scale developed by Flatten et al. (2011). It covers the acquisition (3 items), assimilation (4 items), transformation (4 items), and

exploitation (3 items) of external knowledge. We used a 9-item scale developed by Kortmann (2015) to measure ambidexterity-oriented managerial decisions. Out of the 9 items, 4 were related to adaptability-oriented decisions and 5 alignment-oriented decisions. For the purpose of this study, we used an 11-item scale for measuring strategic orientations proposed by Hult et al. and Olson et al., where 6 items were assigned to innovation (Hult et al. 2004) and another 5 to cost orientation (Olson et al. 2005) was adopted. In turn, the scale was formulated by Wei et al. (2014).

We subjected the empirical material to a statistical analysis, applying the AMOS program. We analyzed basic descriptive statistics, the Shapiro–Wilk (S–W) normality test and modeling structural equations (SEM) using the maximum likelihood method. We also checked the significance of indirect effects using the bootstrapping method. For interpretation of the results, the significance level p was assumed to be 0.05.

Analysis and results

We started the analysis with scales validation used in the final measurement tool. For this purpose, we first checked the reliability of the scales used. We measured reliability using the composite reliability ratio (CR) and Cronbach's internal consistency alpha. In the case of the CR coefficient, we assumed that values above 0.7 are acceptable values and indicate a satisfactory level of reliability (Peterson and Kim 2013). In turn, Cronbach's alpha value means correct reliability if it is in the range between 0.7 and 0.96 (Tavakol and Dennick 2011). In the case of this research, all R coefficients reached satisfactory levels above 0.7 and all Cronbach's alpha coefficients took the desired values from 0.738 to 0.922 (Table 1). This proves the consistency and reliability of the applied measurement scales.

The next step in the validation of the variable measurement methodology was to check the convergent validity and the discriminant validity. For this purpose, we used the procedure of Fornell and Larcker (1981). In this study, we confirmed the convergent validity / convergent validity of each of the variables. Their AVE values were higher than 0.5 and lower than the CR coefficient (Table 1). On the other hand, a satisfactory level of differential accuracy was achieved by ambidexterity-oriented managerial decisions and strategic orientations. The Average Variance Extracted (AVE) value was higher than Maximum Shared Variance (MSV). Regarding absorptive capacity, we confirmed the differential validity for acquisition and transformation. Due to the fact that the AVE value in the case of assimilation and exploitation was lower than MSV, we conducted an additional analysis of the Heterotrait-Monotrait Ratio of Correlations (HTMT) (Henseler et al. 2015, pp. 115–135). The value of the HTMT coefficient for each of the subdimensions of the absorptive capacity exceeded the threshold of 0.850 (Table 2). This means that the differential validity criterion for acquisition, assimilation, transformation and exploitation has been achieved. Thus, we confirmed the convergent validity and the differential validity of all scales used in the measuring tool.

In the second stage of the analysis, we calculated the basic descriptive statistics and performed the Shapiro–Wilk distribution normality test (Table 3). The results show that adaptability-oriented decisions, absorptive capacity, exploitation, cost orientation and new product development have a distribution different from the Gaussian curve. The value of skewness and kurtosis of these variables did not exceed 0.8. Its

Table 1 Validation of the methodology of measuring variables

Items	Cronbach's alpha	CR	AVE	MSV
MDada	0.922	0.931	0.818	0.803
MDali	0.759	0.774	0.535	0.803
MD	0.906			
IO	0.831	0.863	0.523	0.456
CO	0.891	0.891	0.622	0.456
ACacq	0.738	0.879	0.777	0.057
ACass	0.815	0.850	0.590	0.626
ACtra	0.839	0.848	0.606	0.532
ACexp	0.784	0.794	0.575	0.626
AC	0.863			
NPD	0.907	0.891	0.676	

MDada, adaptability-oriented decisions; MDali, alignment-oriented decisions; MD, ambidexterity-oriented managerial decisions; IO, Innovation orientation; CO, Cost orientation; ACacq, acquisition; ACass, assimilation; ACtra, transformation; ACexp, exploitation; AC, absorptive capacity; NPD, new product development

Table 2 Heterotrait–Monotrait ratio of correlations for absorptive capacity

	HTMT			
	1	2	3	4
1. ACacq	–			
2. ACass	0.13	–		
3. ACtra	0.04	0.78	–	
4. ACexp	0.14	0.82	0.74	–

ACacq, acquisition, ACass, assimilation, ACtra, transformation, ACexp, exploitation

means that the deviation is not significant and the distribution of these variables is relatively symmetrical to the mean (George and Mallery 2010). On the other hand, the value of skewness and kurtosis for ACass may prove that the distribution of this variable is inconsistent with the normal distribution. Nevertheless, a visual inspection of the resulting histogram shows that it is symmetrical and resembles a normal distribution more than any other known distribution.

In the third stage, we started testing the research hypotheses. The analyzed model was well suited to the data ($\chi^2(1) = 1.43$; $p = 0.231$; CMIN/DF = 1.432; CFI = 0.998; GFI = 0.993; RMSEA = 0.075; SRMR = 0.016). The obtained results show that ambidexterity-oriented decisions have a strong and positive impact on the absorptive capacity (H_1) and cost orientation (H_{2B}), as well as strongly influence the innovation orientation (H_{2A}). The H_1 and H_2 hypotheses can therefore be considered as positively tested. Moreover, the absorptive capacity is positively and weakly influenced by the innovation orientation (H_{3A}). On the other hand, the impact of the cost orientation on absorptive capacity of the studied enterprise turned out to be insignificant (H_{3B}). Therefore, the obtained results indicate the necessity to reject the hypothesis (H_3). The conducted analyses show that new product development is associated with a positive, moderate impact with the innovation orientation (H_{4A}) and a positive and weak impact with the cost orientation (H_{4B}). So one may consider the H_4 hypothesis to be positively tested. The results of structural equation modeling are presented in Fig. 1 and Table 4.

The tested structural model enabled the empirical verification of the research hypotheses. The obtained results prompted us to deepen the analytical research. Of particular interest was the earlier falsification of the H_3 hypothesis due to the rejection of the H_{3B} hypothesis. For this purpose, we constructed and tested a detailed model (A_1). We included two subdimensions of ambidexterity-oriented decisions

Table 3 Descriptive statistics and S–W test scores

	M	Me	SD	Sk	Kurt	Min	Max	S–W	*p*
MD	30.91	31.50	6.17	− 0.27	− 0.60	17.00	42.00	0.97	0.102
MDada	15.83	16.00	3.39	− 0.42	− 0.46	7.00	21.00	0.96	0.008
MDali	15.08	15.00	3.14	− 0.32	− 0.11	7.00	21.00	0.97	0.066
AC	72.33	72.00	11.12	− 0.63	− 0.23	45.00	88.00	0.95	0.002
ACacq	14.95	15.00	3.17	− 0.22	0.19	6.00	21.00	0.97	0.119
ACass	20.90	22.00	4.73	− 0.97	0.87	5.00	28.00	0.93	< 0.001
ACtra	19.90	20.00	4.20	− 0.52	0.06	9.00	28.00	0.97	0.060
ACexp	16.59	17.00	2.97	− 0.16	− 1.04	10.00	21.00	0.95	0.003
IO	31.64	33.00	5.88	− 0.54	0.03	15.00	42.00	0.97	0.043
CO	29.59	30.00	4.27	− 0.60	− 0.28	18.00	35.00	0.94	< 0.001
NPD	20.22	20.00	4.10	0.54	− 0.80	13.00	28.00	0.91	< 0.001

MD, ambidexterity-oriented managerial decisions; MDada, adaptability-oriented decisions; MDali, alignment-oriented decisions; AC, absorptive capacity; ACacq, acquisition; ACass, assimilation; ACtra, transformation; ACexp, exploitation; IO, Innovation orientation; CO, Cost orientation; NPD, new product development

M, Mean; Me, Median; SD, Standard Deviation; Sk., Skewness; Kurt., Kurtosis; Min. and Max., Lowest and Highest Distribution Value; S–W, Shapiro–Wilk result; *p*, significance

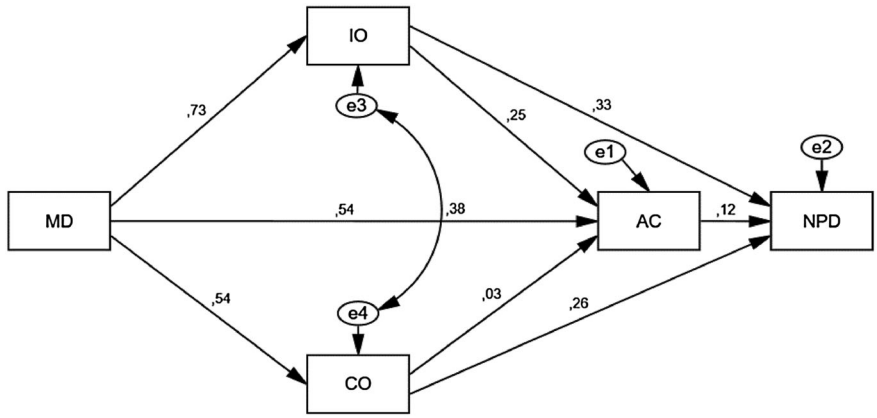

Fig. 1 Results of structural equation modeling (model A). *Note* MD, ambidexterity-oriented managerial decisions; IO, innovation orientation; CO, cost orientation; AC, absorptive capacity; NPD, new product development

Table 4 Regression coefficients for Structural Equation Modeling (model A)

			B	SE	*β*	CR	*p*
MD	→	AC	0.982	0.197	0.545	4.991	< 0.001
MD	→	CO	0.373	0.066	0.540	5.624	< 0.001
MD	→	IO	0.694	0.074	0.728	9.328	< 0.001
IO	→	AC	0.469	0.22	0.248	2.132	0.033
CO	→	AC	0.078	0.246	0.030	0.316	0.752
AC	→	NPD	0.043	0.044	0.117	0.973	0.331
IO	→	NPD	0.233	0.093	0.335	2.497	0.013
CO	→	NPD	0.252	0.109	0.262	2.299	0.021

MD, ambidexterity-oriented managerial decisions; IO, innovation orientation; CO, cost orientation; AC, absorptive capacity; NPD, new product development

B, non-standardized regression coefficient; SE, standard error; *β*, standardized regression coefficient; CR, critical ratio; *p*, significance level

(adaptability-oriented decisions and alignment-oriented decisions) and four sub-dimensions of absorptive capacity (acquisition, assimilation, transformation and exploitation). The detail model A1 turned out to be a good fit for the data ($\chi^2(5) = 2.971$; $p = 0.704$; CMIN/DF = 0.59; CFI = 1.000; GFI = 0.992; RMSEA < 0.001; SRMR = 0.030).

The analysis of direct effects showed that innovation orientation influences one of the four stages of the absorptive capacity, i.e., exploitation (H_{3A}). On the other hand, cost orientation affects the acquisition of knowledge (H_{3B}). This means that the H_3 hypothesis can be considered partially confirmed. Moreover, the direct impact of adaptability-oriented decisions on transformation and innovation orientation and alignment-oriented decisions on assimilation, exploitation and cost orientation is visible. NPD is directly influenced by innovation orientation, cost orientation and operation (Fig. 2; Appendix, Table 6). The analysis of direct effects confirmed the previously obtained results (Fig. 1, Table 4), on the basis of which we adopted the hypotheses H_1, H_2 and H_4. Additionally, we observed two significant mediation effects. It turned out that innovation orientation is a mediator of the relationship between adaptability-oriented decisions and transformation, and between adaptability-oriented decisions and operation. Detailed results of indirect effects are presented in Table 7 (Appendix).

The results of the A_1 model estimation confirmed the results of testing the H_1, H_2 and H_4 hypotheses. There are no grounds to reject them, so they can be considered positively tested. The H_3 hypothesis was rejected as a result of model A estimation. However, the detailed recognition of the relationships between the innovation orientation, cost orientation and individual stages of the absorptive capacity showed that this hypothesis should be considered as partially tested (model A_1). There is a simultaneous impact of the innovation orientation and cost orientation on the absorptive capacity, but it has a special form. Cost orientation affects acquisition, while innovation orientation affects the exploitation of new external knowledge (Table 5).

Discussion and implication

Assigning a specific role to ambidexterity-oriented decisions in acquiring the knowledge necessary to

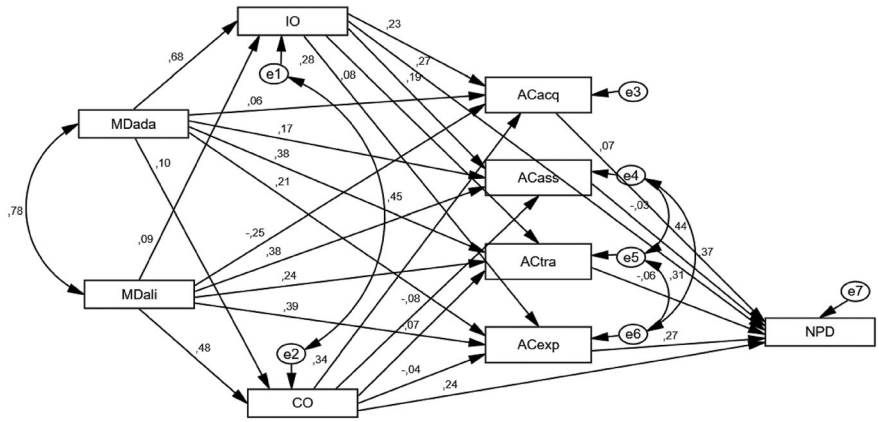

Fig. 2 Results of structural equation modeling (model A_1). *Note* MDada, adaptability-oriented decisions; MDali, alignment-oriented decisions; IO, Innovation orientation; CO, Cost orientation; AC, absorptive capacity; ACacq, acquisition; ACass, assimilation; ACtra, transformation; ACexp, exploitation; NPD, new product development

Table 5 Summary of hypotheses testing

Hypotheses	Result
H_1: There is a positive relationship between ambidexterity-oriented decisions and absorptive capacity	Supported
H_2: There is a positive relationship between ambidexterity-oriented decisions and both innovation orientation (H_{2A}) and cost orientation (H_{2B})	Supported
H_3: There is a positive relationship between both innovation orientation (H_{3A}), cost orientation (H_{3B}) and absorptive capacity	Partially supported
H_4: There is a positive relationship between both innovation orientation (H_{3A}), cost orientation (H_{3B}) and new product development	Supported

create innovation extends the existing research on management support for innovation with an ambidexterity perspective (Cooper and Kleinschmidt 1995; Elenkov and Manev 2005; Kleinschmidt et al. 2007). By balancing adaptability and adaptation-oriented decisions, top management (A1 model) influences the elements of absorptive capacity. In the analyzed enterprise, the acquisition and use of knowledge are affected by decisions aimed at adaptation, while the transformation of knowledge is significantly influenced by decisions focused on adaptation.

It should be emphasized that the analyzed dependencies refer to the enterprise operating under the CE, oriented on innovation and costs. The literature shows that cost dependence can significantly inhibit innovation development, especially in enterprises in the SME sector (Upstill-Goddard et al. 2016). We have proved that cost orientation influences the acquisition of new knowledge. Innovation orientation affects the use of knowledge in practice, i.e., creating innovation.

Acquisition mechanisms in absorption capacity are like a gateway to knowledge (Gluch et al. 2009; Hashim et al. 2015). We explained this mechanism in the example of their case study. VIVE Textile Recycling will only be able to translate new external knowledge into new product development if this new knowledge passes through all stages of the absorption capacity.

Managers decide what type and amount of CE knowledge will be acquired through the company's cost orientation prism. In other words, the amount and kind of new knowledge will depend on decisions aimed at the current needs of the enterprise, which will continuously be assessed in terms of the costs that the enterprise can bear.

However, the mere acquisition of new knowledge does not yet impact the development of new products. New knowledge must be assimilated, i.e., understood and acquired at the level of the organization, which will always depend on its current activities and resources. Then the new knowledge has to be transformed. It consists in combining new knowledge with knowledge already possessed. Adaptation-oriented managerial decisions already shape this stage. That is, one incorporates new knowledge with the existing one in such a way that the company can react to changes in the environment. Our reasoning is confirmed by the results of research conducted in Sweden, which shows that "organizations can influence their ability to absorb green innovation and improve business results by focusing on three predictors of a company's ecological advantage: acquisition, assimilation, and transformation" (Gluch et al. 2009). Knowledge at this stage still does not influence the development of a new product. The company must use this knowledge in practice (operational phase). Only then one will start developing new products. The use of knowledge directly depends on management decisions regarding the company's current operations and management decisions regarding adaptation to changes in the environment.

CE-related issues such as waste reduction, emissions, and supply risk, i.e., strategic eco-innovation activities, are transformed into a new product development process (Ingemarsdotter et al. 2019). Using new knowledge for business purposes will generate a new product and initiate the process of introducing it to the market.

Limitation and direction for future research

Our study provides important information on the role of strategic orientations and ambidexterity-oriented decisions in building the company's ability to absorb CE knowledge and transform it into NPD. Still, it has a few limitations. First of all, we carried out in one large enterprise. The selected research facility fits perfectly into the CE model, using recycling to maximize the use of waste and being a leader in the recycling of textiles and used clothing in Poland. In this case, it was a conscious action tailored to the situation (Yin 2003). The results obtained based on the applied research strategy can be treated as a verification of the theoretical concept (Lee 1989.). The analysis of this exemplary enterprise in terms of our research assumptions allows us to generalize the conclusions to other cases characterized by similar circumstances (Wójcik 2013).

Secondly, the analysis carried out by us has been limited to the impact of ambidexterity-oriented decisions (antecedents at the individual level) and antecedents at the organizational level on the ability to absorb valuable external knowledge and transform it into a new product development process. Absorptive capacity plays a very important role in transforming business models (Kranz et al. 2016). In order for more and more enterprises from the textile and clothing industry to operate in CE, they must make changes to their existing models. The verification of the assumptions of the business model is a way to take action in the CE area, i.e., to eliminate generated waste, reduce the consumption of water, energy and harmful chemicals. Since absorptive capacity plays an important role in making this type of change, it seems reasonable to look for other factors (antecedents) that affect it. Identifying antecedencies of absorptive capacity and their verification in empirical research, although undertaken by researchers (e.g., Volberda et al. 2010; Schweisfurth and Raasch 2018; Stelmaszczyk 2020), are still fragmented. Their identification is the direction of future research.

Acknowledgements Financial support from research project no. SUPB.RN.23 entitled "Ambidexterity-oriented decisions and absorptive capacity in the circular business model enterprise" by Jan Kochanovski University in Poland is gratefully acknowledged.

Author contributions Conceptualization: [MS, AP]; Methodology: [MS, AP]; Formal analysis and investigation: [MS, AP]; Writing—original draft preparation: [MS, AP, DA]; Writing—review and editing: [MS, AP, DA]; Funding acquisition: [MS]; Resources: [MS, AP].

Funding This study was funded by Jan Kochanovski University (Grant numbers SUPB.RN.23).

Declarations

Conflict of interest The authors declare they have no conflict of interest.

Financial interests The authors declare they have no financial interests.

Appendix

See Tables 6 and 7.

Table 6 Regression coefficients for Structural Equation Modeling (model A_1)

			B	SE	*β*	CR	*p*
MDada	→	IO	1.18	0.21	0.68	5.66	< 0.001
MDali	→	CO	0.65	0.21	0.48	3.16	0.002
MDali	→	IO	0.17	0.22	0.09	0.75	0.455
MDada	→	CO	0.12	0.19	0.10	0.63	0.529
MDada	→	ACacq	0.06	0.19	0.06	0.30	0.763
MDada	→	ACass	0.24	0.24	0.18	1.02	0.309
MDada	→	ACtra	0.47	0.22	0.38	2.18	0.029
MDada	→	ACexp	0.18	0.13	0.21	1.46	0.146
MDali	→	ACacq	− 0.25	0.18	− 0.25	− 1.42	0.155
MDali	→	ACass	0.58	0.23	0.38	2.54	0.011
MDali	→	ACtra	0.32	0.21	0.24	1.54	0.124
MDali	→	ACexp	0.37	0.12	0.39	3.09	0.002
CO	→	ACexp	− 0.03	0.07	− 0.04	− 0.37	0.713
CO	→	ACtra	− 0.07	0.12	− 0.07	− 0.58	0.563
IO	→	ACacq	0.12	0.09	0.23	1.32	0.187
IO	→	ACtra	0.06	0.11	0.08	0.53	0.598
IO	→	ACass	0.15	0.12	0.19	1.27	0.203
CO	→	ACass	− 0.09	0.13	− 0.08	− 0.67	0.501
IO	→	ACexp	0.14	0.06	0.28	2.21	0.027
CO	→	ACacq	0.26	0.10	0.34	2.49	0.013
ACexp	→	NPD	0.38	0.19	0.27	1.97	0.049
ACtra	→	NPD	− 0.06	0.12	− 0.06	− 0.49	0.627
ACass	→	NPD	− 0.03	0.11	− 0.03	− 0.23	0.818
CO	→	NPD	0.23	0.11	0.24	2.06	0.040
IO	→	NPD	0.19	0.09	0.27	2.00	0.045
ACacq	→	NPD	0.09	0.12	0.07	0.76	0.446

MD, ambidexterity-oriented managerial decisions; MDada, adaptability-oriented decisions; MDali, alignment-oriented decisions; AC, absorptive capacity; ACacq, acquisition; ACass, assimilation; ACtra, transformation; ACexp, exploitation; IO, innovation orientation; CO, cost orientation; NPD, new product development

B, non-standardized regression coefficient; SE, standard error; *β*, standardized regression coefficient; CR, critical ratio; *p*, significance level

Table 7 Indirect effects in the A_1 model

	B	BootSE	BootLL	BootUL	*p*
MDada → IO → ACacq	0.181	0.20	− 0.172	0.631	0.301
MDada → IO → ACass	0.068	0.15	− 0.257	0.347	0.624
MDada → IO → ACtra	0.164	0.09	0.009	0.372	0.039
MDada → IO → ACexp	0.301	0.16	0.043	0.659	0.022
MDada → CO → ACacq	− 0.011	0.03	− 0.110	0.028	0.351
MDada → CO → ACass	− 0.008	0.03	− 0.110	0.017	0.374
MDada → CO → ACtra	− 0.003	0.02	− 0.064	0.021	0.641
MDada → CO → ACexp	0.015	0.03	− 0.020	0.108	0.308
MDali → IO → ACacq	0.026	0.06	− 0.033	0.233	0.253
MDali → IO → ACass	0.010	0.04	− 0.035	0.156	0.397
MDali → IO → ACtra	0.023	0.04	− 0.031	0.125	0.255
MDali → IO → ACexp	0.043	0.07	− 0.066	0.245	0.309
MDali → CO → ACacq	− 0.058	0.10	− 0.301	0.113	0.471
MDali → CO → ACass	− 0.045	0.08	− 0.245	0.062	0.385
MDali → CO → ACtra	− 0.016	0.06	− 0.139	0.087	0.729
MDali → CO → ACexp	0.081	0.07	− 0.029	0.270	0.150

MD, ambidexterity-oriented managerial decisions; MDada, adaptability-oriented decisions; MDali, alignment-oriented decisions; AC, absorptive capacity; ACacq; acquisition; ACass; assimilation; ACtra; transformation; ACexp; exploitation; IO, innovation orientation; CO, cost orientation; NPD, new product development

B; non-standardized regression coefficient; *SE;* standard error; LL & UL; lower and upper limits of the confidence interval; *p*, significance level

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