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ABSTRACT

Purpose: This study examines the effect of absorptive capacity (ACAP) and co-creation on innovation performance (INN).

Design/methodology/approach: We use survey data from Swedish and Norwegian companies (N = 1102) and establish a cross-national equivalence between Sweden and Norway.

Findings: The subsequent structural model revealed interesting differences. For Sweden, co-creation fully mediates the effect of ACAP on INN, whereas for Norway, ACAP has a direct effect on INN with no mediation. Subsequent regressions including control variables showed that the structural model is reasonably robust. We conclude that, despite the many common national features conducive to innovation between these two countries, sufficient differences remain to create substantial variation in the innovation processes.

Originality: The study presents a second-order model of ACAP that permits a unique test of cross country differences.

INTRODUCTION

Customer co-creation involves sharing activities with customers to target new innovations closer to customers' preferences, with an expected greater likelihood of commercial success (Li and Huang, 2019; Kazadi et al., 2016). While co-creation may be seen as important, many companies have difficulties using and transforming such knowledge into meaningful outcomes. Some companies collect and store huge amounts of information from customers, but are not capable of analyzing this data or acting on its implications (Zhang and Chen, 2008). One explanation of this phenomenon might be that the relatively demanding process of collecting information from customers can drive many organizations to exhaustion long before they arrive at the stage of converting this information into usable knowledge.

Successful innovation often depends on a company's ability to master the complete process – from listening to customers to transforming ideas towards effective commercial ends (Tho, 2019; Belso-Martínez et al., 2016; Gassmann, 2006). Theoretically, this ability may be viewed as an organizational trait (Subramanian, 1996), enabling companies to consistently acquire, assimilate, transform, and exploit new external knowledge toward commercialization (Cohen and Levinthal, 1990; Parida et al., 2012; Zahra and George, 2002).

Together, the four dimensions (acquisition, assimilation, transformation, and exploitation) create the concept of absorptive capacity (ACAP), based on Zahra and George (2002). ACAP has been widely applied in studies investigating how companies convert external knowledge (such as that from suppliers, competitors, universities, research institutions, and customers) into product innovation (e.g., Cepeda-Carrion et al., 2012; Lewin et al., 2011).

While ACAP captures the process of collecting and transforming external customer input, it also involves knowledge-related outcomes. This study argues that customer co-creation may mediate ACAP's effect on innovative performances. Co-creation reflects the interactive activities of innovative processes (Cao and Zhao, 2013; Kazadi et al., 2016; Zhang and Chen, 2008). The extant literature reveals that co-creation supports the commercial success of new products (Ren et al., 2015; Zhang and Chen, 2008). For example, co-creation reduces the amount of time wasted on irrelevant routines, allowing companies to focus on solving their emerging difficulties (Zhang et al., 2016). Hence, companies that engage in co-creation are better situated to understand what information may support current products and processes (Kazadi et al., 2016).

Customer involvement, and its significance for innovation processes (Cao and Zhao, 2013), varies not only between companies but also between countries and contexts (Balmosov et al., 2018; Puia and Ofori-Dankwa, 2013). Accordingly, Lane et al. (2006), and Flatten et al. (2011b) call for studies to integrate national contexts within a framework for ACAP. Nevertheless, although extant research has generally established a relationship between ACAP and innovation performance (e.g. Cao and Zhao, 2013; Inkinen et al., 2015; Lund Vinding, 2006), to the best of our knowledge, no study has tested such a model across different national contexts. In addition, earlier studies explored ACAP in larger companies with multiple subsidiaries (Cenamor et al., 2019). Small high growth gazelle companies and their ability to transform knowledge into commercial outcomes have not been comprehensively studied. While a recent research report identified that several innovative activities were similar in high growth companies in Sweden and Norway (Balmosov et al., 2018), others claim that Swedish companies use customer knowledge to a much greater extent than their Norwegian counterparts: 71% of innovative companies in Sweden cooperated with customers, whilst only 55% of Norwegian companies implemented the same procedure (Statistics Norway, 2015; Statistics Sweden, 2016). Still, the existing literature has failed to document whether expected innovative outcomes depend on companies' ability to process such outcomes through co-creation and ACAP.

This study therefore addresses the call for more research on co-creation, as well as integrating national contexts into research on ACAP. In doing so, we ask the following research questions: under what conditions do ACAP and co-creation increase companies' innovation performance, and to what extent do the relationships among ACAP, co-creation, and innovation performance vary between Sweden and Norway? To answer these questions, we use survey data on Swedish (N = 433) and Norwegian (N = 669) high and normal-growth companies. Although these countries are seemingly similar, our results show that they nonetheless differ to a large extent with regard to the role of co-creation in innovation.

Theoretical Framework and Hypotheses

New ideas, products, and procedures within an organization cause uncertainty (van de Ven, 1986). Many changes are initiated by end customers (Preikschas et al., 2017), particularly customers close to the innovative process (Zhang and Chen, 2008). Customer demands induce companies to react and adapt to changes by both adopting new technologies and routines and developing new products (Tho, 2019; Preikschas et al., 2017). Companies therefore search for different kinds of knowledge from diverse external sources – suppliers, competitors, universities, research institutions, and customers – and they use this knowledge as inputs in their innovation processes. The findings in the literature on both user innovation (see e.g., Neale and Corkindale, 1998; Urban and von Hippel, 1988; von Hippel et al, 2017) and open innovation (Laursen and Salter, 2006) suggest that co-created knowledge from customers is an organizational trait that positively affects future innovative outcomes (Bourgeois et al., 2017).

Co-creation is conceptually challenging because it involves a shared knowledge, which is not always clearly defined, but is nevertheless addressed as property with strict boundaries (Preikschas et al., 2017). It evolves, and components of it are found in various aspects of a product and an organization. This difficulty is reflected in the substantial number of definitions of co-creation. Capturing new relevant knowledge, measuring it, and directing it into *changes* means that a company also needs documentation, reporting, and management standards. As this is assumed to happen in and through interaction with customers, it also requires a new type of mindset (Cenamor et al., 2019). Following this line of thought, recent findings (Cenamor et al., 2017; Kazadi et al., 2016; Wang and Xu, 2018; Zhang et al., 2016) suggest that appropriate customer input supports meaningful innovative outcomes.

Absorptive capacity and its impact on co-creation

It is assumed that additional information brings to light new insights, but it may in some cases be incompatible with a company's current products. Conceptually, ACAP requires the ability to both identify and assimilate knowledge from the environment, as well as the ability to transform and exploit such knowledge (Cohen & Levinthal, 1990; Lane et al., 2006; Zahra & George, 2002). These processes involve numerous information loops connecting various individuals, routines, and technology. In this regard, the quality of external information sources may differ, and so may companies in their ability to process the information.

Although the absorption of knowledge from customers is considered one of the main determinants of successful innovation (e.g., Kazadi et al., 2016), prior studies on ACAP have mostly concerned companies' capacity for absorbing external technological knowledge (e.g., Lane et al., 2006; Tseng et al., 2011).

ACAP captures the process of collecting and transforming external knowledge (Zahra and George, 2002), while co-creation addresses the outcome of this process over time, and is measured in change in company performance (Cenamor et al., 2017; Kazadi et al., 2016; Zhang et al., 2016). ACAP can result in vital knowledge outcomes (Cohen and Levinthal, 1990), and has also been found to allow companies to better understand the usefulness of such knowledge (Cohen and Levinthal, 1990, Lane et al., 2006). ACAP may also ease the dissemination of knowledge in a company, so that external knowledge can be more effectively utilized (Fernhaber and Patel, 2012). Previous research has concluded that ACAP is a major contributor to various higher knowledge outcomes (Cenamor et al., 2017). On the basis of ACAP as the ability to collect and transform knowledge, it should be instrumental in achieving valuable co-creation outcomes. We thus propose our first hypothesis:

H1: ACAP has a positive effect on co-creation.

Co-creation and its impact on innovation performance

Co-creation with customers provides companies with better opportunities for learning, and more possibilities for cooperation between company units. This promotes combining new and existing knowledge, which enables a company to generate new ideas. Consequently, a company's co-creation with customers can contribute to its innovation performance (INN), as it can expand the company's ability to make new inimitable linkages and associations (Cao and Zhao, 2013; Inkinen et al., 2015; Jansen et al., 2005; Papa et al. 2018).

Greater co-creation with customers is therefore of central importance for innovation since more effective and directed co-creation across individuals and organizational units nurtures new and novel knowledge combinations (e.g., van Wijk et al., 2008). Therefore:

H2. Co-creation with customers has a positive effect on INN.

Absorptive capacity and its impact on innovation performance

ACAP is related to INN, and many other scholars have studied the direct effect of ACAP on INN (e.g., Belso-Martínez et al., 2016; Cenamor et al., 2017; Cepeda-Carrion et al., 2012; Kazadi et al., 2016; Zhang et al., 2016). We argue that ACAP improves co-creation and that co-creation, in turn, positively affects INN. Hence, we expect co-creation to be a potentially important precondition for the innovation process and suggest that high ACAP may affect INN in combination with co-creation with customers. Consequently, we propose our third hypothesis:

H3. ACAP is, directly or indirectly through co-creation with customers, positively related to INN.

All hypotheses are shown in Figure 1. Innovation is conditioned by various contextual and national differences, as well as customer involvement (Flatten et al., 2011a-b). We therefore conducted an in-depth investigation using multi-group structural equation modeling (SEM) to study whether the relationships among ACAP, co-creation, and INN vary depending on national differences between Sweden and Norway.

[FIGURE 1 ABOUT HERE]

Research Design

Sampling

The hypotheses were tested using data from 1,102 Norwegian and Swedish companies.

The first sample, comprised of gazelle companies, were externally validated and separately preselected as high-growth companies in both Norway and Sweden.[1] In addition to this high-growth company sample, we also stratified a sample of companies with between 40 and 100 employees in Sweden and Norway within the services, manufacturing, construction, mining, and transportation industries. The aim of generating this stratified sample was to identify a normal-growth (nongazelle) sample to control for country-specific effects not related to gazelles per se (for a full description of the samples in both countries, see Table 1).

Data were collected among 1,651 Norwegian gazelle companies in September 2013 utilizing a digital survey design. In total, 333 companies provided complete questionnaires after two reminders (a response rate of just above 20%); 89% of these questionnaires were answered by CEOs. For the nongazelle sample, the survey was conducted in August-September 2015. A total of 336 completed questionnaires were received (a response rate of 15%), all of which were answered by CEOs.

In Sweden, the sampling process was slightly different: Two students contacted the gazelle companies and identified companies willing to complete the questionnaire. The initial sample consisted of 352 companies. Non-respondents were sent four reminders, and a total of 120 completed questionnaires (a response rate of 34%) were received in April 2012. As in Norway, the questionnaires were mainly answered by CEOs, but R&D managers or other top-level managers appeared in the data. The Swedish nongazelle

[1] The term "gazelles," referring to companies with exceptionally high and stable growth rates, was introduced by Birch and Medoff (1994). The definition of gazelles varies in the literature and across countries. In Sweden, a committee from the business daily *Dagens Industri* and credit rator Upplysningscentralen annually recognizes a number of companies as so-called "gazelle companies". A similar process is found on the Norwegian side by the business daily Dagens Næringsliv. Our gazelle sample is a representative sample of gazelle companies on the Swedish list for 2011 and from the Norwegian list for 2012. Gazelle companies in Sweden had to have: doubled sales in the last four years, annual sales of at least 5 MSEK, and a minimum 10 employees; they must also have made a profit in the last three years and rely on organic (vs acquired) growth. The Norwegian definition is similar, but not identical: the companies must have annual sales of at least 1 MNOK; however, there was no requirement regarding the number of employees.

sample started with 638 companies, and, after active follow-up and contact with different people within the companies, 313 completed questionnaires were received in August-September 2015 (a response rate of 49%).

[Table 1 about here]

Flatten et al. (2011b) find a relationship between ACAP and company performance, Wales et al. (2013) between ACAP and company growth, and Delmas et al. (2011) between ACAP and competitive advantage. In addition, the current literature indicates that high-growing companies have organizational routines and processes that allow them to quickly transform their knowledge into commercial products (Gray, 2006). New commercial ends may not automatically result in sales and profits, but there seems to be a consensus that ACAP fosters growth. However, some aspects of the relationship between ACAP and company growth seem far from obvious, as suggested by evidence from Scandinavia (Wales et al., 2013). Despite the indisputable importance of net job creation from a macroeconomic perspective and the importance attached to innovation as an engine of economic growth, little is known about gazelles as innovators and even less about how they use customer knowledge in their innovation processes.

Questionnaire and measurement scales

Absorptive capacity [ACAP]. The ACAP concept has been empirically validated in single-country studies (e.g., Flatten, Engelen, Zahra, & Brettel, 2011a; Wales et al., 2013), but the scale has not been tested across different national contexts (Flatten et al., 2011b). Following the calls by Lane et al. (2006), and Flatten et al. (2011b) for ACAP studies to integrate national contexts within the framework, we tested the concept in our two-country setting.

The initial proxies of ACAP were based on R&D activities (Cohen and Levinthal, 1990). In the present study, the four ACAP dimensions were modified to reflect ACAP in the customer knowledge context. For this purpose, several rounds of interviews with researchers and practitioners were conducted to identify and verify the relevance of the scale items measuring ACAP. The scale ultimately comprised 14 items: three items for acquisition, four for assimilation, four for transformation, and three for exploitation. The full scale is supplied in the Appendix. All of the items used a 7-point Likert scale (ranging from 1 = completely disagree to 7 = strongly agree).

Co-creation. In general, empirical scholars have often based co-creation proxies on outcome metrics related to competitive advantage (Zhang and Chen, 2008). Following the aforementioned literature, we used a proxy of co-creation by creating a scale developed from Flatten et al. (2011b) and Zhang and Chen (2008). The three items measured the degree to which knowledge and information from customers have contributed to innovation, new product development, and market performance. All of the items used a 7-point Likert scale (1 = completely disagree to 7 = strongly agree).

Innovation performance [INN]. Following Brettel and Cleven (2011), we measured a company's INN by using four items examining their self-reported satisfaction with innovation outcomes and performance, including competitor comparisons. All of these items used a 7-point Likert scale (1 = completely disagree to 7 = strongly agree).

Results

Results: measurement model

We followed the guidelines of Bagozzi and Yi (2012) to assess the quality of the Norwegian and Swedish scales (criteria for reliability, dimensionality, and construct validity) and used exploratory factor analysis (EFA), reliability tests, and confirmatory factor analysis (CFA) based on SEM using AMOS. As CFA is theory-driven, it can be used to test the construct validity of our measurement model (Anderson and Gerbing, 1988).

[Table 2 and 3 about here]

Reliability. To assess the reliability of the dimensions for each country, we individually calculated their respective Cronbach's alphas (Table 2). The alphas (for Sweden and Norway, respectively) were .85 and .82 for acquisition, .86 and .84 for assimilation, .91 and .91 for transformation, and .82 and .81 for exploitation; further, the Cronbach's alphas were .94 and .87 for co-creation and .93 and .88 for INN. Notably, all alphas exceeded the conventional acceptability threshold of .70 (Nunnally, 1978).

To test for common method bias, we included not just one but all constructs in Harman's single-factor test (Podsakoff et al., 2003). Table 2 indicates that the eigenvalues are marginally low (.93 for Sweden and. 98 for Norway) but close to the 1.00 cut-off.

Dimensionality. Our EFA analyses showed structural similarity with the original scale and supported the six-dimensional structure of our model (Table 2). Table 2 illustrates that the explained variance was 79% for Sweden and 76% for Norway. All factor loadings except the first variable in the exploitation construct for Norway (.58) were above .70 and balanced not only within each of the national samples but also within the dimensions. Such balanced loadings are in fact originally an assumption for Cronbach's alpha as they are a strong input for unidimensionality. Consistent with the results of Harman's test for common method bias, the results failed to reveal large cross-loadings for either Sweden or Norway (Podsakoff et al., 2003). Only one cross-loading was above .30, but this cross-loading was removed from Table 2 for simplicity.

We then further tested how well the data fit our hypothesized measurement model. In CFA, several SEM tests can be used to determine whether a model fits the data. Estimated chi-square and normed chi-square tests are common goodness-of-fit tests that are used to describe correspondence between a model and the data (Anderson & Gerbing, 1988). Other widely used goodness-of-fit indices are the Standardized Root Mean Residual (SRMR), which should be less than .10 as a rule of thumb (Hair et al., 2010), Root Mean Square Error of Approximation (RMSEA), which, as a recommendation, should not exceed .08 (Bentler, 1990), and the Comparative Fit Index (CFI), which should be higher than .90 (Hair et al., 2010). We used a model without cross-country constraints as our initial baseline model (Tables 4-6). With the exception of the chi-square statistic, the goodness-of-fit statistics for this model were well within the acceptable limits (χ^2 = 1043.07 [df = 364; p ≤ .000, χ^2/df = 2.87]), CFI = .96, RMSEA = .041, SRMR = .055). Our model indicates that the chi-square is significant (but is expected to be nonsignificant), indicating that there are no differences between the observed data and our theoretical model (Bagozzi and Yi, 2012). However, many researchers, including Bagozzi and Yi (2012), note that issues with the significance of the chi-square statistic may be related to issues regarding sample size: if the sample size is large (> 100), the chi-square statistic tends to become significant. As suggested by Bagozzi and Yi (2012), we therefore trust the coherent results of the other goodness-of-fit measures.

Construct validity. To assess the reliability and validity of the constructs, we subsequently followed the procedure of Bagozzi and Yi (2012) and calculated the composite reliability (CR) and average variance extracted (AVE) using the formulas suggested by Fornell and Larcker (1981) and Bagozzi and Yi (1988, 2012). A commonly used threshold value for CR is .60 (Bagozzi and Yi, 2012); all constructs met this threshold (see Table 3). Moreover, an AVE higher than .50 suggests adequate convergence (Hair et al., 2010). Only the AVE for ACAP for Sweden did not meet the > .50 criterion (although it was only marginally below at .49). In addition, all inter-construct correlations were well below .90, providing even more support for the discriminant validity of the constructs (see Table 4).

[Table 4 and 5 about here]

To further examine the cross-national invariance (see Bagozzi and Yi, 2012), we compared our unconstrained baseline model (Model 1, Table 5) to a constrained model (Model 3, Table 5). We did not test for error invariance because such a test is not required since our goal was to test a theory across national samples.

Configural invariance. We first tested the unconstrained model (Model 1, Table 5). Our model, with its six constructs, was supported for both Norway and Sweden, indicating that the samples exhibit the same factor structure (χ^2 = 1043.07 [df = 364; p ≤ .000, χ^2/df = 2.87], CFI = .96, RMSEA = .041, SRMR = .055). This became our initial baseline model.

Metric invariance. We constrained all factor loadings for the first-order constructs to be equal (Model 2, Table 5). The chi-square difference was significant, indicating inequality of the first-order loadings for the first-order constructs across Sweden and Norway. To identify the source of the differences, we conducted a subsequent analysis. In Model 4 (Table 5), we constrained the most substantial differences between Sweden and Norway, and this partially constrained model indicated a positive, nonsignificant chi-square difference ($\Delta\chi^2$ = 13.448; df = 6; p > .01). Thus, upon limiting the differences between these measures, our model indicated that there were no differences between Sweden and Norway. Next, we constrained all the loadings, second-order constructs, and inter-correlations (Model 3 in Table 5); the difference between Models 3 and 2 was not significant (p = 073), thus rejecting differences, indicating that both the loadings in the first- and second-order constructs and the inter-correlations were equal across both samples. Model 3 thus became our new baseline model with appropriate goodness-of-fit (χ^2 = 1138.257 [df = 388; p ≤ .001, χ^2/df = 2.934]), CFI = .95, RMSEA = .042, SRMR = .053).

Results: structural model

As the measures were now adequate and equal across both countries, we continued with testing our structural model. First, the structural model separately tested the hypotheses for Sweden and Norway. The goodness-of-fit statistics were again within acceptable limits (Sweden: χ^2 = 799.083 with 364 degrees of freedom [χ^2/degrees of freedom = 2.195], p = .000, CFI = .952, RMSEA = .043, SRMR = .058; Norway: χ^2 = 703.675 with 364 degrees of freedom [χ^2/degrees of freedom = 1.933], p = .000, CFI = .947, RMSEA = .045, SRMR = .068). Additionally, we also separated the nongazelle companies from the gazelle companies. For the nongazelle companies, the model explained 55.5% and 55.1% of the variance in co-creation and 39.3% and 37.1% of the variance in INN for Sweden and Norway, respectively. For the gazelle companies, the model explained 30.6% and 34.4% of the variance in co-creation and 26.2% and 34.8% of the variance in INN for Sweden and Norway, respectively. The primary results are reported in Table 6.

Table 6 about here

In support of Hypothesis 1, ACAP and co-creation were positively related for both countries and for nongazelle and gazelle companies (Swedish nongazelles: $\beta = .74$, $p < .001$; Norwegian nongazelles: $\beta = .74$, $p < .001$ vs. Swedish gazelles: $\beta = .55$, $p < .001$; Norwegian gazelles: $\beta = .59$, $p < .001$). Thus, these results suggest that, regardless of whether or not a company is a gazelle: the stronger the company's ACAP, the higher its co-creation. This is valid for both Sweden and Norway

Hypothesis 2, which suggests that a positive relationship exists between co-creation and innovation performance, was supported for both nongazelle and gazelle companies in Sweden, but not for any of the samples in Norway (Swedish nongazelles: $\beta = .21$, $p < .05$; Norwegian nongazelles: $\beta = .01$, $p > .05$ vs. Swedish gazelles: $\beta = .34$, $p < .005$; Norwegian gazelles: $\beta = .08$, $p > .05$). This result indicates that higher levels of co-creation enables Swedish gazelles and nongazelles to improve their innovation performance, but that no positive relation exists between co-creation and innovation performance for Norwegian companies.

Regarding hypothesis 3, the results showed a significant direct relationship between ACAP and innovation performance for nongazelle companies in both countries and for Norwegian gazelles, while no such relationship was identified for Swedish gazelle companies (Swedish nongazelles: $\beta = .46$, $p < .001$; Norwegian nongazelles: $\beta = .60$, $p < .001$ vs. Norwegian gazelles: $\beta = .53$, $p < .001$; Swedish gazelles: $\beta = .24$, $p > .05$). Our model also allows examining whether ACAP indirectly influenced innovation performance as an antecedent through co-creation, a so-called mediation (i.e., tests of indirect effects). A classical mediation test uses added and removed paths to determine whether mediation exists (Baron and Kenny, 1986). However, more recent articles suggest that indirect tests using bootstrapping are more robust and precise (Iacobucci et al., 2007). We used bootstrapping sampling with 95% confidence intervals and found that co-creation significantly mediated ACAP in the Swedish samples (Swedish nongazelles: $\beta = .16$, $p < .05$ vs. Swedish gazelles: $\beta = .19$, $p < .005$). No significant support for mediation was found for Norwegian companies (Norwegian nongazelles: $\beta = .00$, $p > .05$ vs. Norwegian gazelles: $\beta = .06$, $p > .05$). These results indicate that Swedish and Norwegian companies differ: while Swedish companies seem to depend on co-creation with customers for their innovative activities, Norwegian companies have a more streamlined path between ACAP and innovation performance. Stronger customer involvement in Swedish companies or contextual contingencies not identified by our model may be driving these results.

Discussion and Conclusion

Our findings are based on multigroup SEM using survey data from 1,102 Swedish and Norwegian companies. The instruments show acceptable cross-national equivalence, confirming that companies in both Norway and Sweden had a common understanding of the concepts, and therefore allow inference based on the data. The results provide new insights on ACAP and its relation to customer knowledge. Specifically, differences in the role of co-creation exist between the two countries. Our results are consistent with a world in which business logic may differ across countries.

Theoretical implications

Understanding variations in the relation between ACAP, co-creation, and innovation performance have theoretical implications. Although the integration of customer knowledge is essential for any company (Belso-Martínez et al., 2016), previous studies have not accounted for the effectiveness of co-creation. Our study indicates that co-creation, as proxied by the perceived usefulness of customer knowledge, can play a vital role in the relationship between ACAP and innovation performance.

Our results showed that, independent of the national context, companies with poorly developed ACAP are not able to rely on co-creation as effectively as companies with high ACAP. This finding is in line with previous findings in the literature and indicates that companies with high ACAP can better understand the usefulness of co-creation and employ it more effectively (Belso-Martínez et al., 2016; Cohen and Levinthal, 1990; Lane et al., 2006). ACAP has often been operationalized by R&D-related proxies. Our results imply that the ACAP construct is also applicable within the context of customer knowledge.

Co-creation was found to directly affect innovation performance only in the Swedish sample. Despite the proposed positive relationship, based on earlier findings (e.g., the meta-analysis of van Wijk et al., 2008), higher levels of co-creation among Norwegian companies were not found to contribute to innovation performance, as was the case in Swedish companies. The second hypothesis was thus only partially supported. Consequently, factors other than co-creation may be more influential for innovation processes in Norway. Hypothesis 3, suggesting direct or indirect effects from ACAP to innovation performance, was largely supported. However, while co-creation was found to mediate the relationship between ACAP and innovation performance for Swedish companies, no mediation was found for Norwegian companies. For Norwegian companies, on the other hand, a significant direct effect of ACAP on innovation performance was identified, and co-creation did not add to this effect. Our evidence for Sweden suggests that having high ACAP levels does not by itself imply high innovation performance. This is a theoretically interesting result, as it indicates that high ACAP alone is not a sufficient condition for enhanced innovation performance in all contexts; high ACAP in the absence of the right external information is simply not effective.

Our results suggest that the national context may affect customers' involvement in innovation processes, as proposed by the earlier literature (e.g., Balmosov et al., 2018). The most pronounced difference between Sweden and Norway found in this study concerns the role of co-creation with respect to ACAP and innovation performance. While the results for the Swedish sample supported all the hypotheses, the results for the Norwegian one only partially supported the hypothesized model and suggested that co-creation has a more varied role with respect to ACAP and innovation performance. Furthermore, the mediating effect of co-creation for Swedish companies also indicates that their focus on outcomes from customer involvement is crucial for their innovation success, which does not seem to be the case in Norway. At a practical level, this finding indicates that there are different types of business logic in the two countries. Reaching decisions based on customers' involvement appears to be significantly more important to Swedish than to Norwegian companies.

Managerial implications

This study focuses on companies' ability to succeed and excel in innovation and new product development. More specifically, it concerns companies' ability to acquire, assimilate, transform, and exploit outside knowledge and their success in using this ability to demonstrate and enhance their innovative activities. The results have implications for the management of innovative processes in two main areas: (1) the balance between ability and outcomes and (2) the need to consider the company's business logic and national context.

Earlier studies have shown that organizational culture explain national differences (Balmosov et al., 2018). By including both Swedish and Norwegian companies in this study, we found that the national context, while difficult to observe and measure, may be crucial when customers are involved in innovation processes. Our study does not elucidate the cause(s) of such differences, but macro-level factors may be relevant, such as the type of industry and market. Sweden is recognized as being among the most innovative countries in the world, ranked #2 (vs Norway #19), with a world-leading degree of patent-based innovation (Cornell University et al., 2019). The observed national differences imply that multinational enterprises need to consider national business logics in order to manage innovation across borders. The optimal approach for one foreign subsidiary may not be appropriate for another, and by recognizing national differences, companies can optimize the effectiveness of customer co-creation .

Regardless of the national context, ACAP is important for innovation, and it is crucial for managers in fostering innovation processes (Cenamor et al., 2019). However, according to our results, the mechanisms through which ACAP affects innovation vary with the business logic. In "Swedish business logic", co-creation with customers acts as a mediator of the relationship between ACAP and innovation performance, i.e., leveraging the ability to transform knowledge to business value. In "Norwegian business logic", co-creation with customers appears to be inconsequential in innovation.

Conclusion

Innovative activities are vital proof of a company's ability and aspiration to sustain itself in the market and to be ahead of its competitors. As customers play an increasingly important role in forming and pushing companies to succeed, the ability to use customer input has become increasingly important.

In this article, we bring together knowledge-based theories with innovation management and postulate that a company's innovation performance depends on its capabilities to acquire, assimilate, transform, and exploit customer-derived knowledge. We have addressed the call for more research on the importance of customer knowledge on innovation, as well as the call to integrate national contexts into research on ACAP. We examined whether co-creation mediates the effect of the knowledge absorption process on companies' innovation performance, and our results showed that customers' involvement in innovation processes differed between high- and normal-growth companies, as well as between countries. The main difference between Sweden and Norway found in this study was that co-creation mediated the relationship between ACAP and innovation performance for Swedish companies, but not for Norwegian companies, where only a direct effect of ACAP on innovation performance was found. These results indicate that focusing on outcomes from co-creation is crucial for innovation success in the Swedish context, while the general ability to integrate external knowledge into the organization is the primary driver of innovation performance in Norway.

This study contributes to the literature and theory in several ways. First, our results offer crucial insights regarding ACAP outcomes. Our findings indicate that high ACAP is associated with a higher possibility of successfully applying new, integrated knowledge toward commercial ends and thus stimulating innovation. Second, we empirically examined ACAP in a non-R&D context. Our results revealed that this construct is also applicable in the context of co-creation, and our study validated a four-dimensional ACAP scale regarding customer-derived knowledge. This complements previous measures based on instruments operationalized by R&D-related proxies, or scales focused solely on absorbing technological knowledge. Third, we found that the relationships among ACAP, co-creation, and innovation performance differ between national contexts. These results were reasonably robust after controlling for various factors. In sum, we found support for our hypothesis that ACAP increases co-creation. However, the effects of ACAP on innovation performance differ depending on the country, suggesting that explanations regarding the effects of ACAP on innovation performance could be found in varying national conditions, cultures, or business logic. The mixed results call for more fine-grained methods in future research, with the aim of refining how different contextual factors affect the role of ACAP in innovation processes.

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APPENDIX 1

ACAP scale. Items based on Flatten et al. (2011b).

Acquisition

Please specify to what extent your company uses external resources to obtain customer-oriented information (e.g., personal networks, consultants, seminars, internet, database, professional journals, academic publications, market research, regulations, and laws concerning environment/technique/health/security):

ACQ 1– The search for relevant information about our customers in our industry is an everyday business in our company.

ACQ 2 – The management of our company motivates employees to use information sources that are relevant to our industry in order to get new information.

ACQ 3 – The management of our company also expects employees to deal with information beyond our industry.

Assimilation

Please rate to what extent the following statements fit the communication structure within your company:

ASS 1 – In our company, we communicate ideas about customers across departments.

ASS 2 – The management staff in our company often emphasize our ability to work across departments to solve problems related to information about our customers.

ASS 3 – In our company, there is a quick information flow, e.g., if a business unit obtains important information, it communicates this information promptly to all other business units or departments.

ASS 4 – Management of our company demands periodical cross-departmental meetings in order to exchange information about new problems and achievements about customer involvement in our new innovations.

Transformation

Please specify the extent to which the following statements apply when it comes to how your company processes knowledge:

TRANS 1 – Employees in our company have the ability to understand and analyze information about our customers.

TRANS 2 – Employees in our company are used to absorbing information and knowledge about our customers.

TRANS 3 – Employees in our company successfully convert existing knowledge into new insights.

TRANS 4 – Employees in our company are able to apply new information and knowledge in their practical work.

Exploitation

Please specify the extent that the following statements fit the commercial exploitation of new knowledge in your company (Please think about all of the relevant company divisions such as R&D, production, marketing, and accounting):

EXP 1 – The management of our company supports the development of prototypes on the basis of new information from customers.

EXP 2 – Our company regularly reconsiders new technologies and adapts them according to new knowledge that is obtained about our customers.

EXP 3 – Our company has the ability to work more effectively by adopting new technologies.

Co-creation. Developed from Zhang and Chen (2008)

Zhang and Chen (2008) defined indicators for the involvement of customers in key co-creation activities. We have adapted and developed the indicators further to our customer context.

Listed below are a few statements about the outcome of your company's collaboration with customers concerning innovation. Please specify to what extent each of these statements corresponds to your company's situation.

CC 1 – Overall, involving customers in the innovation process has been a success.

CC 2 – The contribution of various customers has been vital for developing products/services.

CC 3 – Products and services that have been developed in a way that considers customer participation and knowledge have been accepted by the market.

Innovation performance. Developed from Brettel and Cleven (2011)

Below are a few statements that indicate how innovative your company has been. Please specify which of these statements best resemble your company and the extent to which they are true.

INN 1 – A number of real innovative products or processes have improved in the last five years.

INN 2 – In our respective market, we are known for our innovative products.

INN 3 – The rate of new products that were created in our portfolio is significantly greater compared to our competitors.

INN 4 – The rate of sales that were generated from our new products is greater than our competitors.

Figures and Tables

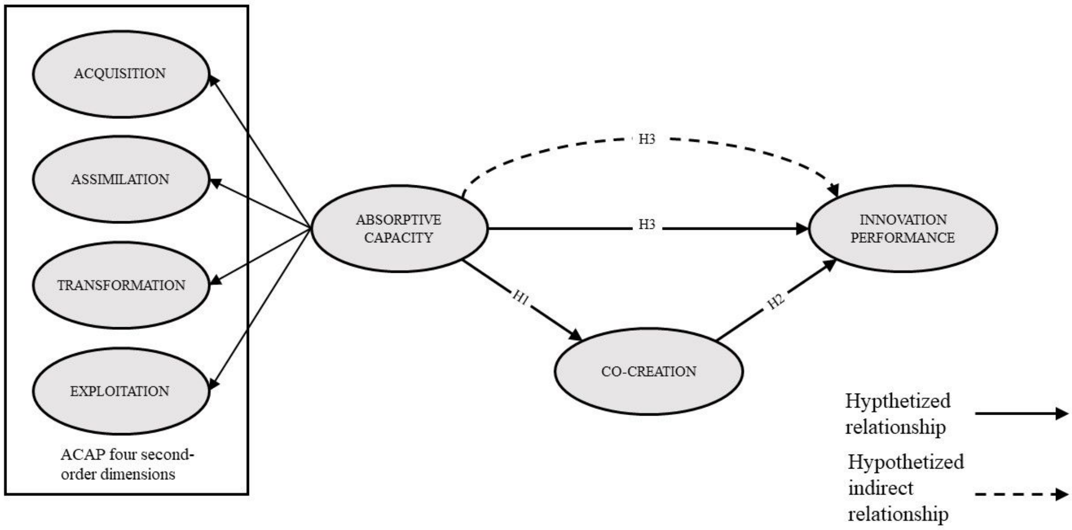

Figure 1:
Hypothesized relationships

Table 1. Descriptive Statistics of Sample in Sweden and Norway

	Sweden	Norway	Total Sample
Total sample	433	669	1,102
Gazelle companies	120	333	453
Company age (years)	30.1	11.7	18.9
Annual sales 2013 (thousand EUR)	12,340	19,830	16,855
Employees 2013	47.4	37.4	41.5
Average salary 2013 (thousand EUR)	65.7	74.9	71.1
Number of patents	1.36	0.25	0.68
Companies in service sector	49%	60%	56%

Company age was up to date at the time of the data collection. Service sector is defined as NACE rev. 2 sections G-N and P-S (Eurostat, 2008; OECD, 2008). All other data are from the Orbis (http://orbis.bvdinfo.com) and Retriever (http://www.retriever-info.com) databases.

Table 2: Exploratory Factor Analysis (Sweden N = 433; Norway N = 669)

	ACQ	ASS	TRANS	EXPL	CO-CREATE	INN
Acq1	.84(.78)					
Acq2	.86(.83)					
Acq3	.81(.81)					
Ass1		.79(.71)				
Ass2		.78(.77)				
Ass3		.73(.77)				
Ass4		.73(.70)				
Trans1			.82(.80)			
Trans2			.86(.83)			
Trans3			.83(.83)			
Trans4			.84(.80)			
Expl1				.81(.58)		
Expl2				.75(.80)		
Expl3				.73(.79)		
CC1					.86(.76)	
CC2					.85(.87)	
CC3					.81(.84)	
INN1						.88(.74)
INN2						.86(.78)
INN3						.89(.88)
INN4						.85(.86)
Reliability Cronbach's alpha (α)	α=.85 (α=.82)	α=.86 (α=.84)	α=.91 (α=.91)	α=.82 (α=.81)	α=.94 (α=.87)	α=.93 (α=.88)

Variance explained 79.08 (75.65) Eigenvalue > 0.93(0.98). Principal component analysis (varimax). Kaiser normalization. Rotation converges in six iterations generating six components. Loadings < .40 omitted for readability.
Norwegian sample reported in parentheses.

Table 3: CFA unconstrained model (Sweden N = 433; Norway N = 669)

Construct			Loading SWE	Loading NOR	AVE SWE	AVE NOR	CR SWE	CR NOR
ACAP Second order								
Acq	<---	*ACAP*	0.56	0.60				
Ass	<---	*ACAP*	0.78	0.79	0.49	0.54	0.65	0.72
Trans	<---	*ACAP*	0.63	0.75				
Expl	<---	*ACAP*	0.79	0.79				
Latent first order constructs								
Acq1	<---	Acq	0.84	0.70				
Acq2	<---	Acq	0.85	0.85	0.66	0.62	0.77	0.84
Acq3	<---	Acq	0.75	0.80				
Ass1	<---	Ass	0.87	0.82				
Ass2	<---	Ass	0.74	0.84	0.61	0.58	0.79	0.77
Ass3	<---	Ass	0.81	0.70				
Ass4	<---	Ass	0.70	0.68				
Trans1	<---	Trans	0.83	0.80				
Trans2	<---	Trans	0.90	0.86	0.72	0.73	0.88	0.89
Trans3	<---	Trans	0.83	0.90				
Trans4	<---	Trans	0.82	0.85				
Expl1	<---	Expl	0.84	0.73				
Expl2	<---	Expl	0.82	0.89	0.61	0.62	0.74	0.75
Expl3	<---	Expl	0.69	0.73				
CC1	<---	CC	0.91	0.78				
CC2	<---	CC	0.94	0.86	0.84	0.70	0.93	0.83
CC3	<---	CC	0.89	0.88				
INN1	<---	INN	0.93	0.74				
INN2	<---	INN	0.91	0.75	0.78	0.66	0.88	0.89
INN3	<---	INN	0.87	0.89				
INN4	<---	INN	0.82	0.87				

Maximum likelihood. CR = composite reliability = (Σ of standardized loadings)^2/(Σ of standardized loadings)^2 +Σ of ε_j. AVE = average variance extracted = Σ of (standardized loadings)^2/(Σ of (standardized loadings)^2 + Σ of $\varepsilon_{j.}$ CV= convergent validity (AVE > .50).

Table 4: Inter-correlations between constructs (Sweden N = 433; Norway N = 669)

	(1)	(2)	(3)
1. ACAP	1.00		
2. Co-creation	0.70 (0.66)	1.00	
3. INN	0.54 (0.60)	0.52 (0.43)	1.00

All correlations significant at a 0.001 level.
Norwegian sample reported in parentheses.

Table 5: Test invariance across Norway and Sweden (Sweden N = 433; Norway N = 669)

Model	$\chi 2$ (df)	p-value	$\chi 2$/DF	CFI	RMSEA	SRMR	Model comparison	$\Delta\chi 2$ (df)	p-value	Conclusion and difference test
Model 1: Unconstrained	1,043.07 (364)	.000	2.866	.96	.041	.055				Baseline model. Observed data fit hypothesized theoretical model.
Model 2: Loadings first- and second-order construct constrained	1,126.727 (382)	.000	2.950	.95	.042	.051	(2-1)	83.657 (18)	0.000	Chi-square increases. New baseline model.
Model 3 : Loadings first- and second-order equal + inter-correlations equal	1,138.257 (388)	.000	2.934	.95	.042	.053	(3-2)	11.530 (6)	.073	Assuming model 2 with constrained loadings and inter-correlations to be chi-correct. The p-value (> 0.05) indicates no differences exist and loadings first- and second-order constructs are equal across Sweden and Norway. New baseline model. Conclusion: no differences in loadings; measures are adequate across both countries.
Model 4: Loadings partially constrained. Second-order loadings + INN1 + INN2 representing high difference	1,056.518 (369)	.000	2.863	.95	.041	.054	(4-1)	13.448 (6)	.020	Check robustness by constraining highest differences. Constraining loadings in second-order construct and items 1–2 in innovation performance. The p-value is positive (p-value). The marginal differences that exist come from second-order loadings and items 1–2.

Table 6: Unconstrained SEM Regression (structural model) for Norway and Sweden

		Nongazelles (Sweden N = 313; Norway N = 336)			Gazelles (Sweden N = 120; Norway N = 333)		
		Standardized beta (t-value)	p-value	Conclusion	Standardized beta (t-value)	p-value	Conclusion
H1: ACAP→ Co-creation	SWE	0.745*** (10.630)	0.000	Supported	0.553*** (4.360)	0.000	Supported
	NOR	0.742*** (9.760)	0.000	Supported	0.586*** (6.971)	0.000	Supported
H2: Co-creation → INN	SWE	0.209* (2.268)	0.023	Supported	0.342** (3,199)	0,001	Supported
	NOR	0.006$^{N.S}$ (0.062)	0.951	No support	0.099$^{N.S}$ (1.332)	0.183	No support
H3 (direct effect): ACAP→ Co-creation → INN	SWE	0.455*** (4.417)	0.000	Supported	0.236$^{N.S}$ (1.940)	0.052	No support
	NOR	0.605*** (5.430)	0.000	Supported	0.526*** (5.714)	0.000	Supported
		Standardized indirect mediation effect (Bootstrap 95% confidence interval)					
		Std indirect effect	p-value		Std indirect effect	p-value	
ACAP→ Co-creation → INN	SWE	0.156*	0.042	Supported	0.189**	0.003	Supported
	NOR	0.004$^{N.S}$	0.973	No support	0.058$^{N.S}$	0.192	No support
R^2 Co-creation	SWE	55.5 %			30.6 %		
	NOR	55.1 %			34.4 %		
R^2 INN	SWE	39.3 %			26.2 %		
	NOR	37.1 %			34.8 %		
Goodness-of-Fit (structural model)	SWE	χ^2 = 799.083 with 364 degrees of freedom (χ^2/df = 2.195); p-value = 0.000; CFI = .952; RMSEA = .043; SRMR = .058					
	NOR	χ^2 = 703.675 with 364 degrees of freedom (χ^2/df = 1.933); p-value = 0.000; CFI = .947; RMSEA = .045; SRMR = .068					

***p < .001; **p < .005; *p < .05