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Building greener motorhomes: How dual-purpose technical and relational capabilities affect component and full product innovation

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Abstract

Research Summary: This study investigates how dual-purpose technical and relational capabilities influence two types of product innovation: component and full product. We consider product modification, manufacturing, supplier relationship, and customer relationship capabilities, analyzing their interactions and interrelationships through an inductive study set in the motorhome industry. We find patterns between capabilities and types of product innovations and then use a descriptive qualitative comparative analysis to refine and explore the nuances of these relationships, uncovering combinations of capabilities that enable and inhibit different types of product innovation. We thus provide empirical evidence for how dual-purpose capabilities are deployed dynamically, in that skills can be used in both the normal course of business and to create something new.

Managerial Summary: Firms strive to innovate and create new full products and new components. Skills related to innovation include product modification, manufacturing, supplier management, and customer relations, all of which are also important for normal activities. While an adequate level of these capabilities can support the day-to-day business, a superior level is required to innovate. Our study of the motorhome industry indicates that supplier management is most important for component innovation and manufacturing

expertise is most critical for full product innovation. However, we also find that a lack in some capabilities can be compensated for by superior capabilities in other areas, which could be important in situations of scarce resources and shows different possible paths toward product innovation.

KEYWORDS
capabilities, innovation, new product development

1 | INTRODUCTION

> "Innovation is adapting to a new world order, recreating ideas that can flow from something – an evolution from one concept to another, from the ***subtle to extreme***. And today, some of the key questions we have regarding innovations that we need in our industry have to do with a drive toward cheaper, stronger, better, lighter, ***greener***, more functional, more practical and prettier concepts." Dicky Reigel, CEO Thor Industries (Barbulesco, 2008).

Innovation is vital for firms to be competitive and successful. Defined as "the core renewal process in any organization" (Bessant, Lamming, Noke, & Phillips, 2005, p. 1366), innovation can be focused on generating new methods of accomplishing work or creating new goods or services. Product innovation can be defined as a combination of technologies introduced commercially to meet a market need (Afuah, 2002; Utterback & Abernathy, 1975). Various aspects of product innovation have been investigated, such as its amount of disruption, its degree of exploitation versus exploration, and its changes in interfaces (Baldwin & Clark, 2003; Christensen, 1997; Greve, 2007). Product innovation can take two forms, component and full product, with the former involving a change to one part of a particular product and the latter reflecting a completely new offering.

Key antecedents to product innovation include technical and relational capabilities (Abernathy & Clark, 1985; Danneels, 2002; von Hippel, 1988). Technical capabilities include product modification skills, which are related to understanding the underlying technology and markets clearly connect to product innovation (Brown & Eisenhardt, 1995; Hullova, Simms, Trott, & Laczko, 2019). Likewise, technical capabilities related to processes and manufacturing are also vital in creating new products (Trott & Simms, 2017; von Hippel, 1988). Relational capabilities include maintaining rich supplier relationships, which are also key to new product innovation (Petersen, Handfield, & Ragatz, 2005; von Hippel, 1988). Similarly, relational capabilities involving managing customers and developing rich collaborations with them have also been found to be important in developing new products (Atuahene-Gima, 2005; von Hippel, 1988). There also has been some work investigating how these capabilities may be complements or substitutes toward product innovations (Frohlich & Westbrook, 2001; Haus-Reve, Fitjar, & Rodríguez-Pose, 2019; Laursen & Salter, 2006; Rothaermel & Hess, 2007).

A common and intriguing quality of these four capabilities is that they can be deployed to normal or new applications. Helfat and Winter (2011) term capabilities with this nature as

"dual-purpose" in that they are both ordinary, used for today's business, and dynamic, used to innovate and create tomorrow's business. Products require routine modifications, as well as new manifestations; operational skills are needed to meet current production, as well as to adapt to new demands; supplier relationships are important for procuring current inputs, as well as for discovering new ones; and customer relationships are vital to maintaining sales in current markets, as well as to developing new opportunities (Danneels, 2016; Helfat & Winter, 2011; Kahl, 2014). We posit that a baseline, or adequate, level of a dual-purpose capability is sufficient for ordinary applications but that a superior level is required for dynamic deployment. That is, firms need superior levels of these capabilities to allow them to go beyond their ordinary application and enable them to innovate. Additionally, given that relational and technical capabilities may be complements or substitutes toward product innovations, we posit that some firms' capacity to deploy such dual-purpose capabilities to dynamic applications might hinge on whether they are used separately or in combination with other dual-purpose capabilities.

Our study investigates when product innovation does and does not result from these dual-purpose capabilities. We distinguish between component and full product innovation, suggesting that different capabilities may be more important for one type or the other. We consider capabilities holistically, examining to what extent and which combinations of capabilities appear to enable or inhibit component versus full product innovations. In order to untangle the ordinary and dynamic applications of these capabilities, we avoided a setting that has a high degree of environmental change since it would be difficult to distinguish between ordinary and dynamic applications, since all firms in those spaces would have strongly honed dynamic tendencies, and since it would be more difficult to pinpoint a common product innovation (Ahuja, Lampert, & Tandon, 2008; Schilke, Hu, & Helfat, 2018; Trott & Simms, 2017). Thus, our context is technologically mature with well-established firms and products, with markets that experienced a shock, motivating product innovation.

Our setting is the U.S. motorhome industry, which experienced an extreme economic shock, motivating both component and full product innovations, but with considerable variation in firms' responses. Some firms engaged in both types, some in just component, others in just full product, and one in neither. We use a case study design that covers the entire population of the industry over 5 years, enabling us to synthesize and extend theory (Edmondson & McManus, 2007; Eisenhardt & Graebner, 2007). Our initial analysis of extensive qualitative data including trade publications, interviews, and observations uncovered relationships between particular capabilities and the different types of product innovation. These results pointed to deeper relationships between capabilities, which we then explored using descriptive qualitative comparative analysis (QCA) (Lacey & Cohen, 2016). This allowed us to discover combinations of capabilities that were associated with the existence or lack of different product innovation outcomes. Interestingly, we found that product modification capabilities are not central to a firm's engagement in either type of innovation, being peripheral and necessary in combination with other capabilities, although this finding may be an artifact of our setting in which products are modified routinely. Firms with superior manufacturing capabilities are likely to pursue full product innovation. We also found that firms with superior supplier relationship capabilities engage in component innovation, whereas those that lack these capabilities do not unless they have superior manufacturing capabilities, indicating a potential substitution effect. Customer relationship capabilities complement manufacturing capabilities enabling full product innovation; without strong customer ties, full product innovation is less likely.

Our study provides several contributions to the strategy and innovation literatures. First, we demonstrate how and when dual-purpose capabilities can be successfully deployed toward a

dynamic application, highlighting when this duality is possible and when it is deterred. In this way, we answer the call for understanding the complementary and substitution effects between dynamic and ordinary capabilities (Danneels, 2016; Schilke et al., 2018). Second, by distinguishing between component and full product innovations, we provide a more nuanced understanding of which combinations of technical and relational capabilities are associated with these outcomes, akin to work on complementary assets (Taylor & Helfat, 2009; Teece, 2006). Third, we combine traditional qualitative methods with a descriptive QCA approach for a small sample of cases, using fine-grained, context-specific capability data, which allows us to carefully analyze both what enables and what deters new product innovation; this use of QCA in a descriptive approach has rarely been used in the strategy literature (Greckhamer, Furnari, Fiss, & Aguilera, 2018; Marx, Rihoux, & Ragin, 2014; Meuer & Fiss, 2020).

2 | PRODUCT-BASED INNOVATION AND ITS ANTECEDENT CAPABILITIES

2.1 | Types of product-based innovation: Component and full product

Product-based innovation can involve either changing components or creating an entirely new product for a market; we term these "component innovation" and "full product innovation," respectively. See Table A1 in the Online Appendix for definitions and references for these and our key theoretical constructs. A firm can adapt an established product using technologically novel components with the intent to differentiate, providing valued new features. Alternately, a firm can design and create a completely new product offering, representing a systemic approach to optimize desired features, which may or may not include new components (Lee & Berente, 2012; Salvador, Forza, & Rungtusanatham, 2002). An example of a component product innovation would be an automotive supplier changing a temperature sensor in a catalytic converter, whereas a full product innovation would involve a completely redesigned catalytic converter system (Lee & Berente, 2012). If a component innovation was so impactful as to require an overall product redesign, then we consider it to be full product innovation.

Prior work illuminates various aspects of how firms develop, manage, and implement different types of product-based innovation. Research in the automotive industry suggests that firms often pursue component innovation, such as steering wheels and electric ignitions, in house when targeting higher-end markets but rely on suppliers for standardized components for lower-end products (Argyres & Bigelow, 2010). Regarding full product innovation, research indicates that the original design hierarchy of a product shapes the future technological evolution of that product (Baldwin & Clark, 2003; Clark, 1989; Huenteler, Ossenbrink, Schmidt, & Hoffmann, 2016). Past studies have also investigated exploitative versus exploratory product innovations in which the emphasis on each depends on existing competencies and aspiration levels (Danneels, 2002, 2008; Greve, 2007).

Prior frameworks have considered different categories of innovation that involve components. In particular, Henderson and Clark's model hinges on the extent to which component knowledge is enhanced or destroyed and the changes in the linkages between the components (Henderson & Clark, 1990). Although changes to components may lead to systemic changes, this framework generally suggests differing magnitudes of technical change, with more incremental innovations involving enhanced component knowledge and common linkages reflecting less change and more radical innovation involving new component knowledge and new

linkages reflecting a more dramatic change. This magnitude of change is what most scholars have discussed when using this and other related frameworks, such as the work on modularity (Baldwin & Clark, 2003).

In contrast, our focus is simply on whether a product innovation involves a component or the full product and what drives these different types of innovation. If the linkages between components are all new, then this must involve a full product innovation since the overall system would have to be redesigned. But a full product innovation could occur without changing the linkages; if every component involved is different, this represents a full product innovation, even if the linkages between them are unchanged. Moreover, if a component is changed but did not require an overall redesign, this represents a component innovation, regardless of whether this new component is based on existing or new technology. In sum, our analysis is agnostic to the extent of true technological change, as innovation is considered from the customer market perspective (Afuah, 2002; Ahuja et al., 2008). Specifically, our focus is on how the antecedent technical and relational capabilities relate to component versus full product innovations.

2.2 | Antecedent technical capabilities: Product modification and manufacturing

Firms engaging in product-based innovation have been shown to leverage technical capabilities in product modification and manufacturing (Leonard-Barton, 1992). We define product modification capability as the ability to change and develop products based on knowledge of the products, markets, and underlying technologies. Thus, product modification capabilities combine knowledge of the existing components, products, and architectures with a strong market orientation, to understand the latent needs and value-orientations of existing and new customer segments (Dougherty, 1992; Hullova et al., 2019). This capability enables a firm to better implement routine improvements, to understand where opportunities lie in existing markets (Chen, Damanpour, & Reilly, 2010), and to design and create a product to fit a market opportunity (Danneels & Sethi, 2011; Zhou & Wu, 2010).

Manufacturing capabilities leverage deep knowledge of manufacturing routines, practices, and equipment to find areas of improvement in existing processes, to facilitate greater efficiency, or to support novel processes or products (Danneels, 2002; Hayes & Wheelwright, 1984; Leonard-Barton, 1992). We define manufacturing capability as the ability to effectively and efficiently produce in high volumes due to smooth routines and dedicated employees. This expertise regarding both scientific and firm-specific techniques is developed over time, includes tacit knowledge held by employees, and enables innovation (Lewis, Brandon-Jones, Slack, & Howard, 2010; Verona, 1999). This capability helps firms identify which resources will complement their existing manufacturing processes without exacting higher costs (Christmann, 2000; Größler & Grübner, 2006). This is especially relevant in more mature technology settings, where innovation is based upon experience and investments in production processes, rather than patents and research activities (Lewis et al., 2010; Trott & Simms, 2017).

2.3 | Antecedent relational capabilities: Managing supplier and customer relationships

Firms engaging in product-based innovation also leverage relational capabilities in managing both suppliers and customers (Brown & Eisenhardt, 1995; Frohlich & Westbrook, 2001; von

Hippel, 1988). We define supplier relationship capabilities as a firm's ability to build and maintain mutually beneficial relationships with suppliers, allowing them to smoothly obtain inputs and gain from close collaboration with suppliers (Chen, Paulraj, & Lado, 2004; Holcomb & Hitt, 2007). Superior supplier relationship capabilities can aid a firm in obtaining necessary inputs at lower costs or greater speed (Chen et al., 2004; Frohlich & Westbrook, 2001). Such capabilities can also reduce uncertainty and avoid opportunism, promoting trust (Dyer & Singh, 1998; Holcomb & Hitt, 2007; Provan & Skinner, 1989). Superior supplier relationships can promote smooth routine transactions, as well as the creation of customized components or products, which provides the firm with a competitive advantage (Petersen et al., 2005). Numerous studies have confirmed the importance of suppliers for product innovations (Castañer, Mulotte, Garrette, & Dussauge, 2014; Leiponen & Byma, 2009; Ozer & Zhang, 2015).

Customer relationship capability leverages knowledge of and relationships with existing customer segments who purchase a firm's products and services to better serve their current needs and understand their latent desires (Brown & Eisenhardt, 1995). We define this capability as the ability to build and maintain mutually beneficial relationships with customers, resulting in a greater understanding of customers' needs. Superior customer relationships enable a firm to produce components or products that are customized, thus providing the firm with an advantage over rivals with more generic products (Atuahene-Gima, 2005). By identifying customer needs, a firm can build them into the design of a new product (Danneels, 2002; Frohlich & Westbrook, 2001). Furthermore, superior customer relationship capabilities allow firms to identify opportunities for innovations in existing markets and to introduce novel products into these markets given their deep customer understanding (Arnold, Fang, & Palmatier, 2011; Chatterji & Fabrizio, 2014). Thus, superior customer relationship capabilities are vital for firms engaging in innovation because they reduce the risk that the new products will fail (Voss, Sirdeshmukh, & Voss, 2008). Many studies have supported the importance of these capabilities in developing new products (Ozer & Zhang, 2015; Trott & Simms, 2017).

Indeed, both technical and relational capabilities are important antecedents for product innovation, but it is not clear how they are related. As with combining internal and external R&D activities, some studies suggest that technical and relational capabilities act as complements, at least with certain innovations (Abernathy & Clark, 1985; Afuah & Bahram, 1995; Cassiman & Veuglers, 2006). For example, Danneels (2002) has found that existing versus new technical and customer competences are connected to exploitative versus exploratory product innovations. Empirical studies have also found complementarities between customer and supplier relationships and product innovation (Ozer & Zhang, 2015), as well as between these and manufacturing capabilities (Lewis et al., 2010; Trott & Simms, 2017). However, other work suggests that these capabilities may act as substitutes, such as Leonard-Barton's research on core rigidities leading some firms to component and others to full product innovation (Leonard-Barton, 1992). Some studies have also found a negative interaction between internal and external collaborations in product development (Haus-Reve et al., 2019; Laursen & Salter, 2006).

2.4 | Dual-purpose capabilities

We emphasize four capabilities that prior research suggests lead to product innovation—product modification, manufacturing, supplier management, and customer relations. All these capabilities share the quality that they are dual purpose, in that they can be applied as ordinary capabilities to support current business, and as dynamic capabilities to support future business.

Helfat and Winter (2011) note the "blurry line" between ordinary and dynamic capabilities, commenting that some capabilities can serve both purposes, using market access capabilities, such as brand management, as an example. The authors argue that strong brand management capabilities permit a firm to promote both existing and new products effectively, relying on the same resources and routines to do so. Kahl (2014) later provides the example of production planning as another dual-purpose capability, arguing that this capability permits a firm to support the requirements of an existing production line to meet current demand, as well as to reconfigure its existing supplier ecosystem to support the requirements of a new production line. Kahl (2014) observes that the dynamic application of this dual-purpose capability arose after the firm under study gained strengths in its ordinary application.

We propose that while an adequate level of these capabilities allows a firm to compete using current products, if the firm strives for product innovation, it requires a greater degree of these skills. Consider an analogy to physical fitness. One needs a baseline level of activity to meet standard guidelines of 150 min/week, obtain some health benefits, and achieve ordinary fitness, such as not panting when going up a flight of stairs. Suppose there are two athletes—one who jogs three times per week at a leisurely pace, maybe covering 12 miles, versus one who trains five times per week, does tempo and endurance runs, and logs at least 30 miles. Both may meet the ordinary standard, but, if forced to run a 5K race, the latter would likely perform considerably better.

We use this same logic to support the idea that firms with superior dual-purpose capabilities in ordinary applications should be more likely to successfully respond to a shock and innovate by being able to deploy these capabilities in a dynamic manner. Evidence of superior product modification capabilities could include frequent model changes and more product introductions aimed at the current market; use of lean manufacturing, recycling, and high levels of employee engagement all point toward superior manufacturing capabilities; collaborating with suppliers and using a balance of insourced and outsourced inputs provide evidence of superior supplier relationship capabilities; and having close downstream relationships and being recognized in the industry for this quality both indicate superior customer relationships. We summarize these ideas in Table 1.

In summary, extant research does help us better understand what drives product-based innovations. However, we lack insight into which capabilities affect a firm's strategic choice to pursue full product versus component innovation and how these specific capabilities interrelate. Our study investigates the antecedent capabilities of innovation, specifically the role of dual-purpose technical and relational capabilities, both separately and in combination, to unpack why and how the firms in our study engaged in component and/or full product innovation.

3 | RESEARCH CONTEXT AND METHODS

We studied product-based innovation—in this case, component and full product innovations targeted toward a new "green," market aimed at sustainability—using a combination of a case study design (Yin, 2003) and the extended case method (Burawoy, 1998). We intended to develop midrange theory (Eisenhardt, 1989), and thus pursued both qualitative and basic quantitative data to develop theory relating product-based innovation to technical and relational capabilities (Edmondson & McManus, 2007). We followed a pattern-matching logic (Gibbert, Ruigrok, & Wicki, 2008; Yin, 2003), followed by a QCA analysis. Because relationships between all of these capabilities and types of product-based innovation have not yet been fully

TABLE 1 Levels of dual-purpose technical and relational capabilities

Capability	Base level—adequate *Fine for "ordinary" applications*	Advanced level—Superior *Need this to successfully deploy dynamically*
Product modification	Introduce different variants, mainly incremental	Frequently change most models; introduce completely different models; larger technical staff and higher R&D spending
Manufacturing	Produce at sufficient volumes in facilities suited for normal production, using standard practices	Use advanced techniques, such as lean manufacturing and extensive recycling; high levels of craftsmanship and employee engagement
Supplier relationship	Obtain required inputs without major issues; may procure very few inputs externally or may fully outsource	Have supplier partnerships, with evidence of collaboration; recognize superior suppliers; balance internal and external sourcing of inputs
Customer relationship	Successfully market and distribute products	Recognized in the industry as having close customer relationships; have a relatively small number of deep ties with major customers or distributors

understood and developed, and because we lack a good understanding of dual-purpose capabilities, a case study approach was appropriate (Eisenhardt & Graebner, 2007).

Our combination of a case study design and the extended case method permitted us to develop cases of individual firms within the greater industry (Yin, 2003), leveraging participant-observation to generate connections between our field observations and existing theory (Burawoy, 1998). By engaging with participants on their premises and during industry events, we were able to generate deep insights into how each firm innovated and how they used capabilities. We drew upon the extended case method to connect our insights within and across firms to existing theory on innovation. This led us toward elaborating existing theory on product-based innovation, with the goal of illuminating nuances inherent in our setting (Burawoy, 1998). Thus, we relied on the objective practices and information provided by the participants in the field to generate insights into differences between full product and component innovation, as well as the four types of antecedent capabilities and the relationships among them.

3.1 | Research context: U.S. Type A motorhome industry

Our study examines the entire population of the U.S. Type A motorhome industry, from 2008 to 2013. This is a small industry, which allowed us to examine the entire population (Miles & Huberman, 1994; Yin, 2003). Because of the commonalities of the firms, we can control for many variables that could affect innovation (size, industry, age, slack resources) while also highlighting the constructs of interest (Eisenhardt & Graebner, 2007; Yin, 2003). This sector is similar to other mature manufacturing industries in that environmental dynamism is modest (Leiponen & Byma, 2009; Sorescu & Spanjol, 2008; Trott & Simms, 2017). Thus, we can better identify the deployment of capabilities in ordinary versus dynamic applications.

The time period of our study begins with the Great Recession and ends with the industry's "new normal," when firms returned to prerecession production levels (Woodyard, 2013). During this time, motorhome firms were under extreme pressure to find new markets through product-based innovation, as their existing markets had shrunk significantly. Financial slack, a well-established antecedent to innovation, was unavailable to all firms, which allows us to more cleanly isolate and examine antecedent technical and relational capabilities. Since firms responded differently to these pressures, we have variance in our key outcome, innovations for a "green" market.

Type A motorhomes represent about 40% of the $5 billion U.S. RV industry, which also includes camper vans (Type B), motorhomes on truck frames (Type C), towable trailers, pop-up campers, and related products. Type A motorhomes are 21–45 ft in length, weigh around 15 tons, and have an average retail price of $180,000, with some models retailing for well over $500,000. Their interiors are up to 400 square feet, including living and dining areas, kitchen, master bedroom, additional sleeping quarters, and one or more bathrooms.

Seven manufacturers produce motorhomes, including Fleetwood, Forest River, Navistar, Newmar, Thor, Tiffin, and Winnebago. All but Tiffin and Winnebago are located in the Elkhart, Indiana area, most compete in related RV markets, and all have been in this sector for several decades. The firms share common suppliers and dealers. Business is seasonal and cyclical: demand peaks in the spring and is stronger when the economy is robust. Consumers upgrade about every 3 years and are motivated by social comparison (Lazy Days Inc., 2008).

These firms modify their products regularly, with both minor changes (different floorplans) and major overhauls, typically involving a new model aimed at the same market. Speed to market is critical, as is common for small manufacturing firms (Leiponen & Byma, 2009). Innovations are rarely covered by patents and typically are imitated within months. Product changes are gleaned from other industries (e.g., boating, housing), developed internally, and/or created with suppliers and dealers. A plant manager told us it is important for manufacturers to be "fast on your feet," get customer and employee input, and "knock it out." Winnebago's CEO concurred, stating, "Innovation has long played a dominant role in creating consumer demand" (Barbulesco, 2008). However, truly novel products and products aimed at fresh markets are relatively rare, as is the case for similar sectors (Sorescu & Spanjol, 2008).

3.2 | Data sources

Our cases of each firm were developed from a combination of data sources to triangulate our understanding and ensure that we balanced retrospective with contemporaneous points of view, as well as ensuring that no single point of view dominated our understanding (Gibbert et al., 2008; Jick, 1979; Miles & Huberman, 1994). We triangulated between observations at national trade shows and factories, employee interviews, firm-produced documents, industry buyers' guides, and industry and consumer trade journals. Table A2 in the Online Appendix summarizes our firms.

3.2.1 | Observations

We attended the industry's national trade show annually for 5 years. These shows, aimed at dealers and not open to the general public, allowed us to examine how new products are

created and introduced, and to understand major industry issues (Lampel & Meyer, 2008). The impetus of attracting consumers interested in sustainability was raised at the November 2008 show and continued for several years thereafter. We also attended consumer trade shows and visited factories for five of the seven firms. These field observations permitted us to gather objective data on outcomes and capabilities involved in product-based innovations (Burawoy, 1998).

3.2.2 | Interviews

At all trade shows, we conducted interviews with manufacturers, suppliers, and dealers. We also conducted on-site interviews at several firms' manufacturing locations. Interviews were open-ended but focused on how actors perceived innovation and how firms pursued and understood innovation within the industry. These interviews supplemented our objective observational data to include retrospective accounts and interpretations of innovation outcomes and firms' capabilities from the perspective of field participants (Burawoy, 1998).

3.2.3 | Archival and other data

We corroborated information gathered through observations and interviews with a variety of additional data. We created a database of all motorhome models on the market from 2008 to 2013 using the annual industry buyers' guide. We noted which models were unchanged from the prior year, had minor revisions, or were distinctly new designs, and which had solar panels. We also obtained articles from the industry's trade and consumer journals, documents from manufacturers and industry associations, and 10K and related filings.

3.3 | Data analysis

3.3.1 | Case analysis

We iteratively moved between theory and our cases, analyzing data while flexibly and opportunistically gathering observational, interview, and archival data until saturation was reached (Eisenhardt, 1989; Miles & Huberman, 1994). Drawing on the case study design method, we developed cases for each firm and the industry, focusing on characteristics and events that were corroborated by multiple sources (Barratt, Choi, & Li, 2011; Yin, 2003). We traced each firm's approach to product-based innovation and found evidence of the strength of their supplier and customer relationships, as well as their product modification and manufacturing skills. Through observations and interviews at the trade show visits, we had regular contact with informants over the entire 5-year study, which allowed us to track changes within and between individual firms. Additionally, we drew on the extended case method to reflexively engage in analysis during this period, iterating between data and existing theory to connect the reported and observed innovation practices and outcomes we saw emerging to elaborate concepts in product-based innovation (Burawoy, 1998). We also performed several member checks on our understanding of the data and verified the appropriateness of our preliminary findings, both of the relative strength of capabilities for each firm, and our understanding of the importance of various technological changes, by interviewing dealers and suppliers who are familiar with but not

embedded in our focal firms (Lincoln & Guba, 1990; Thomas, 2017). These member checks were conducted during the trade show and factory tour visits, in which we shared these preliminary findings of firm capabilities and technological changes for feedback (Kornbluh, 2015), verifying our preliminary results from industry members. Thus, relationships emerged between capabilities as antecedents and innovation types.

3.3.2 | Qualitative comparative analysis

After completing the case analyses, we wanted to understand better how the firms' various capabilities were interrelated and how these linked to the two product-based innovation outcomes. The configurational nature of our data lends itself to QCA, which is ideal for small N studies and allows for equifinality (Greckhamer, Misangyi, & Fiss, 2013; Ragin, 2008). QCA also allows that combinations leading to the presence of an outcome are not necessarily symmetrical with combinations leading to its absence, so we could explore the antecedents of both pursuing a type of product-based innovation and *not* pursuing that type of innovation (Fiss, 2011; Ragin, 2008). Using QCA in a descriptive capacity deepened our primary qualitative analyses by highlighting the nuances of the relationships (Lacey & Cohen, 2016).

4 | FINDINGS: DUAL-PURPOSE CAPABILITIES AND PRODUCT INNOVATION

Given the competitive landscape during the time of our study, all of the motorhome firms were motivated to conduct product-based innovation to reach a new "green" market, but not all of them did so. We posit that a lack of innovation geared toward this new market may be due to a gap or weakness in capabilities, specifically product modification, manufacturing, supplier relationships, and customer relationships. We first review our findings on the nature of the product-based innovation engaged in by each firm. Then, for each capability, we present our evidence to understand how firms compare (Barratt et al., 2011).

4.1 | Product-based innovation types

During the time of our study, most firms innovated beyond their typical activities by introducing new components and/or full products targeted toward a new market of "green" consumers. Gearing products toward consumers who value environmentally sustainable, or "greener," alternatives is clearly a novel product-based innovation strategy as these are both new products and a new market for this industry. For example, Tiffin's sales manager commented that his customers are "used to big rigs," implying that the green market is different and new for them. The green demographic tends to be younger and more liberal than typical customers, with a greater concern for fuel economy. Full product innovations aimed at this market were smaller, shorter rigs, sometimes available on hybrid chassis, and built with fuel efficiency in mind. Overall, all of the seven firms except Forest River attempted innovation targeted at this market during our study. We summarize these data in Table 2.

Component product innovation occurs when a firm adapts a current product through changes in parts of the system. In our study, component innovation involved integrating solar

TABLE 2 Innovations aimed at new "green" market—Full product and component

	Fleetwood	Forest River	Navistar	Newmar	Thor	Tiffin	Winnebago
Fully green model (full product)	None	None	Vesta	None	Avanti	Breeze	Via/Reyo
Prototype introduced			2010		2008	2009	2008
Media awards			None		Honorable mention, 2008 show	Best in Show, 2009	Best in Show, 2008
Media quotes			"A comfortable balance between affordability and luxury" "By no means downsized – it's 32′ long"		"Farsighted motorized concept offering a likely peek into the future"	"Breaks new ground with regard to diesel-pusher length due to its relative short dimensions"	"Most complete, integrated concept that we've seen in quite some time... meet(s) the evolving definition of a Class A motorhome"
In MY2013 guide?			No		No (was in 2011, 12)	Yes (2011, 12)	Yes (2010, 11, 12)
MY2013 price			$226,500 (2012)		$163,125 (2012)	$170.660	$124,125
Chassis			Roadmaster		Freightliner	PowerGlide	Mercedes-Benz sprinter
Engine			Navistar MaxForce7		Cummins 6.7L	Navistar MaxForce7	M-B 3.0 turbodiesel
Length			32′		28′	28′	25′
Gvwr			29,000		18,000	23,500	11,030
MY2013 status			Dropped		Dropped	In production	In production
Full product innovation summary			Late Unclear market		Early Not long lasting	Late Long lasting	Early Long lasting
Component innovation—solar panels	22% gas models solar (65% overall)	0% gas models solar (0% overall)	7% gas models solar (55% overall)	89% gas models solar (93% overall)	0% gas models solar (5% overall)	0% gas models solar (28% overall)	42% gas models solar (53% overall)

panel technology into current motorhomes to attract green consumers. Fleetwood, Navistar, Newmar, and Winnebago all engaged in this component innovation, adding solar panels to 7–89% of their gas models. As one article from 2009 discussed:

> [T]here was little warmth and encouragement to be found when Go Power! Inc. introduced its first products to the RV marketplace a little more than a decade ago. '(The solar panels) were met with skepticism,' said [one executive]. ... [Now] company officials report that demand for their solar panel products is increasing, thanks in part to the influx of younger RVers entering the market. (*RV Pro*)

We identified full product innovation when a firm created a completely new product aimed at the new "green" market and clearly distinct from their usual offerings. These rigs were smaller, more streamlined, and less traditionally styled. Navistar, Thor, Tiffin, and Winnebago all introduced new models aimed at this market. An executive from Navistar explained the company's motivation to develop new models to target green consumers:

> I see the world going more toward the greener side. ... [Navistar has] got a lot of great "green" technologies that we're going to ... take advantage of on the RV side, and ... you'll see us come out with some really innovative products in the future that help us move our customers around and get to different places while having less impact on the environment. (*RV Pro*, 2009)

4.2 | Technical capabilities

4.2.1 | Product modification capability

To ascertain a firm's level of product modification capability, we examined our interview and archival data to get a sense of each firm's typical stance toward change and estimated the size of their technical staff (Brown & Eisenhardt, 1995; Verona, 1999). We also used the buyer's guide data, which reflected the number of models, floor plans, and chassis offered by each firm. We assessed the strength of this capability by the number of models offered, the percentage of models changed over time, and the number of new models. We considered a higher percentage of gas versus diesel models as an indicator of superior product modification skills since these are higher in volume. We also considered the number of floor plans offered; a high number indicates that the firm is pursuing very minor changes, as compared to more substantial model changes or entirely new models. As such, a low number actually signals a superior modification capability. We supplemented this categorization with information obtained from our observations, interviews, and archival sources, such as articles, web sites, or other documents which discussed these activities and the level of R&D expenditures. We summarize our assessment of firms' product modification capabilities below and provide a detailed analysis in Table 3.

Winnebago and Fleetwood offer more models annually than other firms, at 14 and 10, respectively. Fleetwood and Thor average two new models per year, considerably more than other firms. Winnebago, Navistar, Fleetwood, and Thor changed over 75% of their models during our study period; however, Navistar averages only about six models per year, most of which are in the premium, low volume diesel category. Winnebago spends over $3 million per year on R&D and, while less flashy than some of their competitors, focuses on engineering and

TABLE 3 Technical capabilities: Nature and strength of product modification and manufacturing capabilities by firm

	MY2013 gas/diesel	Avg # floor plans	# Models 09–13	% Models chgd, MY09–MY13	# New, MY09–13	Product modification capability	Mfg. floor observations	Employee observations	Recycling	Mfg. capability
Fleetwood	14/17	2.6	73 (31 in 13)	79%	7	Superior	Lean; also make Type C in single 1.2 million square feet plant	Highly experienced, took pay cuts, committed	Unknown	Superior
Forest River	3/3	3.8	30	63%	2	Adequate	Dirty, disorganized, odd processes; also make Type C and towables; many plants in Elkhart area	Rough, loud, fast, piecework	None	Adequate
Navistar	2/3	3.6	40 (8 in 2009)	80%	10 (8 in 2009)	Adequate	Automotive influenced, sophisticated; consolidated to single Elkhart IN plant (1.1 million square feet); also make towables	Tired of feeling jerked around; bonus if no warranty claims	Yes	Superior
Newmar	2/6	5	36	69%	2	Adequate	Old school construction, spotless; single IN plant	Mennonite, like the rules/values	Extensive	Adequate
Thor	5/2	3	36	75%	8	Superior	Sophisticated, bar codes and automation; 12 manufacturing buildings; also make B and C; many nearby towable plants	Slick, competitive, pay for production/dock for warranty claims	Yes	Superior
Tiffin	1/5	3.2	28	29%	3	Adequate	Clean, craftsmanship great attention to detail; only make Class A motorhomes	Dedicated to firm/town/family; work ethic	Unknown	Superior
Winnebago	6/6	2.7	66	86%	4	Superior	Combine best of old and new; wide variety of processes; make B and C; 38 manufacturing buildings, 2 million square feet; also towable plant in IN	Well trained, hourly, not rushed, committed	Extensive	Superior

technical modifications. Their director of marketing commented that they strive to improve even the mundane elements of the coach, noting that they are "like Dyson vacuums–we take ordinary things and make them better." Fleetwood has streamlined their product introduction process by colocating engineers and designers, which has halved the time of new model to get to market (Ashley, 2010). Thor has a fast, experimental style; one informant commented that this is a "cowboy industry" and "if you don't change quickly you're dead," pointing out a towable unit created in just 1 month before the major trade show. We thus categorized Winnebago, Fleetwood, and Thor as having superior product modification skills.

In contrast, we rated Forest River, Navistar, Newmar, and Tiffin as adequate in product modification. They each offer a relatively limited product line, with all but Forest River emphasizing higher-end, diesel units. Forest River tends to produce lower-end products, as their focus is on towable trailers, not motorhomes. They and Newmar averaged about two new models over the entire 5-year period and changed a much lower percentage of models. Newmar, Forest River, and Navistar have more floor plans, rather than true model changes. Tiffin modified less than 30% of their products; only 30 of Tiffin's 1,250 employees are engineers, so it is unlikely that much technical support is available. When the founder Bob Tiffin was asked about innovation, he said there were "no real innovations lately...there hasn't been much since slide outs," which were first introduced in 1991.

4.2.2 | Manufacturing capabilities

To bring products to market, firms need strong manufacturing skills (Garud, Tuertcher, & Van de Ven, 2013). Indicators of strengths in this capability include higher production volumes, since repetition should increase these skills (Lieberman, 1984), and more sophisticated processes (Clark, 1989). For example, observations of plant floors indicated that some firms used more automation, incorporated lean manufacturing techniques, and had better housekeeping and orderliness, which all pointed toward greater manufacturing expertise (Hayes, Wheelwright, & Clark, 1988; Lee, 2002). Throughput-based incentive systems tend to lead to greater defects than those rooted in teamwork and commitment (Hatcher & Ross, 1991); firms taking the latter approach should enjoy more employee involvement, thus improving processes and having superior manufacturing capabilities. Greater degrees of recycling are also an indicator of superior process engineering and manufacturing skills (Christmann, 2000). We summarize our assessment of firms' manufacturing capabilities below and provide a detailed analysis in Table 3.

Fleetwood, Navistar, Thor, Tiffin, and Winnebago all have superior manufacturing capabilities, based on our plant tours, interviews, and archival sources. Fleetwood emphasizes lean production methods and has a highly experienced, committed workforce. Navistar's facility is sophisticated and reflects their connections with the automotive industry, with employees paid a bonus for a lack of warranty claims. Thor demonstrates sophisticated and modern manufacturing techniques, emphasizing orderliness and efficiency, with a high degree of automation and some recycling, although they do use incentive-based pay. Tiffin only produces Class A motorhomes, so their facilities are dedicated to these products with an emphasis on detail and craftsmanship. They also emphasize the work ethic and dedication of their employees. Winnebago self-describes as a manufacturer, not an assembler, of motorhomes meaning they take a more "craft" approach to building their products (Irwin, Lahneman, & Parmigiani, 2018). They emphasize lean manufacturing techniques and combine the "best of

both worlds" of old-style craftsmanship (clay models) and modern manufacturing techniques (CAD systems). This was evident on our plant tours, which showed organized, varied, and sophisticated manufacturing operations with actively involved employees and evidence of recycling.

Firms with merely adequate manufacturing capabilities include Newmar and Forest River. Both have relatively lower production volumes. Newmar's plant was spotless but used old school construction—"stick and tin" with metal studs, rather than solid one-piece walls. Their production methods were basic, with little automation, albeit with some recycling. The Forest River plant we toured was disorganized; rock music was blaring, with workers more interested in speed than quality, as they were paid by piecework. Practices appeared basic, with inventory scattered throughout and an apparent disregard for recycling. Their focus was not on craftsmanship, but rather on value from non-technical features, such as glass sinks.

4.3 | Relational capabilities

4.3.1 | Supplier relational capabilities

To analyze the strength of each firm's supplier relationship capabilities, we first considered the degree of vertical integration, as indicated by the extent of internal production of input components, such as chassis, doors, walls, cabinetry, and windows. Firms that are highly vertically integrated make most of their components in-house and also manage assembly of the final products in-house, meaning they have limited interaction with suppliers and thus are unlikely to form close relationships (Dyer & Singh, 1998). On the other hand, firms that extensively outsource do so with components but keep assembly of the final products in-house. These firms will have insufficient technical knowledge about inputs to share with suppliers since they do not produce those components internally (Lane & Lubatkin, 1998; Parmigiani & Mitchell, 2009). Thus, firms with a moderate degree of vertical integration should be more collaborative, and thus have stronger relationships with suppliers. These relationships are important since suppliers often bring their own component improvements for incorporation into motorhomes, thus leading to both routine and more dramatic product modifications.

Based primarily on interviews, we also determined the purchasing model of the firm: whether it was more collaborative and aimed at codeveloping solutions or if it was price-focused, competitive, and aimed at reducing costs (Fisher, 1997; Frohlich & Westbrook, 2001). Finally, we considered each firm's relationship with a common, major supplier, Freightliner. This supplier provides six of the seven firms with their chassis, the most expensive and complex input component, as the entire motorhome is built upon this part. We summarize our findings below and provide a detailed analysis in Table 4.

Newmar, Fleetwood, and Winnebago enjoy superior supplier relationship capabilities, being moderately vertically integrated, sourcing between 10 and 90% of requirements from external suppliers. These firms also emphasize collaborative purchasing models and have codeveloped projects with Freightliner. Newmar exemplifies superior supplier relationships, depending on suppliers for all of their chassis and 40% of their other components. Most of their 200 suppliers are local and are honored at an annual awards dinner. At one of these events, the company president commented: "Newmar depends on you, our partners, to bring new ideas to our company in order to constantly improve the products we sell" (2011). They have partnerships with several key suppliers, including Spartan and Sony, as well as an agreement with Freightliner to

TABLE 4 Relational capabilities: Nature and strength of supplier relationships and customer relationships by firm

	Purchasing model	Vertical integration	Relationship with freightliner	Supplier relationship capabilities	Dealer management style	# Dealers	RVDA awards	Customer relationship capabilities
Fleetwood	Collaborative; decentralized to divisions	~35%	Strong; hybrid chassis, Powerbridge, other codeveloped projects	Superior	Moving from "hoopla" to "working relationships"	65	1	Adequate
Forest River	Pooled with towables; price-based; competitive	~5%	Weak	Adequate	"Wild west"; flashy; aggressive	100	1	Adequate
Navistar	Centralized; Navistar influenced	~100%	None	Adequate	All dealer relationships had to be recreated after bankruptcy, no warranties	68	2	Adequate
Newmar	Collaborative, supplier awards, local	~40%	Fine; has partnership	Superior	Stand behind dealers; give awards	125	8	Superior
Thor	Pooled with towables; price-based; competitive	~0%	Fine; has partnership	Adequate	Slick, competitive, differentials for high volume dealers	300	0	Adequate
Tiffin	Unknown but buy very little	~100%	Weak, but some assistance; small volume	Adequate	Protect territories; small number; must "do right" by customer	85	13	Superior
Winnebago	Collaborative; rotate buyers	~60%	Strong; hybrid chassis, sprinter, other codeveloped projects	Superior	Dual structure—sales and service; same manufacturer's suggested retail price for all	225	16	Superior

Abbreviation: RVDA, recreational vehicle dealers' association.

build a customized chassis for three models. According to Freightliner's director of sales and marketing, "We worked closely with the Newmar team to design and develop a chassis to meet the specific needs and expectations of their customers" (2010). Likewise, Fleetwood and Winnebago both have moderate levels of vertical integration, and also both have strong relationships with Freightliner, having codeveloped multiple products.

In contrast, Navistar, Tiffin, Thor, and Forest River all have adequate supplier relationship capabilities. Navistar and Tiffin are very highly vertically integrated and produce chassis internally, thus having a weak or nonexistent relationship with Freightliner. Forest River and Thor outsource nearly all of their inputs, thereby not having sufficient knowledge internally to collaborate and codevelop with suppliers. They also tend to be adversarial and cost-focused. Thor considers itself to be "the Wal-Mart of the industry," taking a cost-focused purchasing model with their 300 suppliers. They consider themselves "experts at assembly," leaving the technical details and warranty issues to suppliers. One informant mentioned that they follow the "golden rule–if you buy more, you get more [discounts]." Similarly, according to a major supplier, when Forest River bought Coachman, they demanded lower prices, but kept component brand distinctions so they could enjoy cost reductions while retaining differentiation.

4.3.2 | Customer relationship capabilities

As with suppliers, there are no exclusive relationships between motorhome firms and their key customers, dealers; unlike in automobile sales, dealers typically carry several firms' brands. To ascertain customer relationship capability, we looked for indicators of dealer satisfaction and depth in these relationships (Danneels, 2002; Schoenherr & Swink, 2012; Voss et al., 2008). We posited that a relatively small number of dealers should be associated with superior capabilities, as this suggests that manufacturers protect dealer territories, which should result in deeper relationships (Provan & Skinner, 1989). The main dealer's association, recreational vehicle dealers' association (RVDA), conducts annual surveys in which dealers rate manufacturers; we use this rating to indicate strong customer ties. We supplemented these analyses with observations and interviews and provide a detailed analysis in Table 4.

Newmar, Tiffin, and Winnebago have superior capabilities in customer relationships, as they invest in their dealers and are multiple-time winners of the RVDA award. Tiffin exemplified close customer relationships, with their founder Bob Tiffin saying that the "customer drives it all." Competitors and suppliers concur that Tiffin is viewed as a high-quality firm, with an excellent reputation. Advertising taglines of "A family business, built around yours" and "Wherever you go, there we are" suggest the importance of customer relationships. They have no desire to expand their stable network of 85 dealers and, although they share some dealers with other manufacturers, Tiffin manages their relationships differently. Tiffin has been recognized by the RVDA as a Quality Circle winner in 13 of the 18 years the award has been distributed. Their general manager commented, "We are humbled by the high marks we continue to receive from dealers, but the Quality Circle Award represents close communication, mutual respect and strong partnerships between Tiffin Motorhomes and dealers" (2012). Similarly, Newmar has a smaller dealer network and emphasizes "standing behind their dealers," viewing them as representing their firm to customers, and giving out awards to recognize their best dealers. Although Winnebago has a larger dealer network, the firm aims for consistency in its relationship across the network, deemphasizing competition between dealers and instead supporting equality and transparency with separate structures supporting sales and service.

TABLE 5 Summary of capabilities and component and full product innovations

	Product modification capabilities	Manufacturing capabilities	Supplier relationship capabilities	Customer relationship capabilities	"Green" component innovation	"Green" full product innovation
Fleetwood	**Superior**	**Superior**	**Superior**	Adequate	**22% gas (65% total)**	None
Forest River	Adequate	Adequate	Adequate	Adequate	0% gas (0% total)	None
Navistar	Adequate	**Superior**	Adequate	Adequate	**7% gas (55% total)**	**Late and missed market**
Newmar	Adequate	Adequate	**Superior**	Superior	**89% gas (93% total)**	None
Thor	**Superior**	**Superior**	Adequate	Adequate	0% gas (5% total)	**Early, not sustained**
Tiffin	Adequate	**Superior**	Adequate	**Superior**	0% gas (28% total)	**Late and sustained**
Winnebago	**Superior**	**Superior**	**Superior**	**Superior**	**42% gas (53% total)**	**Early and sustained**

Forest River, Thor, Navistar, and Fleetwood exemplify adequate customer relationship capabilities. None of them have won more than two RVDA awards over the entire 18 year period in which they have been distributed. Forest River and Thor continually expand by adding new dealers and have more transactional relationships. These firms tend to foster competition between dealers and will switch if a dealer is not selling a sufficient quantity of products. These weaker capabilities are further demonstrated by Forest River having won only one RVDA dealer award, and Thor receiving none. Navistar's dealer ties were decimated by the firm's bankruptcy. At the end of 2007, Navistar had 364 dealers, but all of these relationships had to be recreated; as of mid-2012, this count was under 70. In late 2010, informants noted that the "lack of product warranty and sentiment as to poor product quality continues to anger both consumers and dealers" and that having products on their lots without warranties has "created significant animosity toward the brand." This was confirmed by several industry sources. Similarly, Fleetwood's dealer relationships were also disrupted by the firm's bankruptcy and change in ownership during the economic crisis period.

4.4 | Dual-purpose capabilities and "green" innovations

Table 5 summarizes our findings regarding types of product innovation and the differing technical and relational capabilities for each firm. To meet "green" demand, firms could engage in component innovation, offer fully new products, or decline to participate. From our qualitative analysis, firms with strengths in certain capabilities engaged in certain kinds of innovation, whereas those with adequate capabilities did not. Those with superior supplier relationship capabilities developed component innovations, while those with adequate capabilities did not. Firms with superior manufacturing capabilities chose full product innovation, while those with adequate capabilities did not. For those that offered full product innovations, those with superior product modification capabilities introduced products earlier, but superior customer relationship capabilities appeared required to sustain them. This suggests that superior dual-purpose capabilities were applied dynamically to enable product innovations.

Although these patterns held generally, we saw some instances where firms did not entirely conform to this pattern. Furthermore, we lacked a full understanding of why a particular capability appeared to be correlated with a particular innovation outcome, suggesting nuances to uncover. That is, we could not draw one-to-one relationships between strengths in individual capabilities and innovation outcomes. QCA analysis, with its emphasis on combinations of conditions (Fiss, 2011), permits us to holistically analyze the interrelationships between capabilities and innovation, including when capabilities were insufficient for innovation.

4.5 | QCA findings

Using the observations outlined in Table 6 above, we analyzed our cases using QCA. We ran analyses for four outcomes: component innovation, no component innovation, full product innovation, and no full product innovation. Table 6 shows the results of our QCA. The table displays different combinations of capabilities that can lead to each of the four possible outcomes. The circles in each column show whether a capability is present (●) or absent (⊖) in the combination. QCA also delineates which capabilities are central to, or a "core condition" of, the combination (denoted by larger circles) and which are peripheral conditions (denoted by smaller

TABLE 6 QCA results

Outcomes	Component			No component			Full product			No full product		
Combinations	1a	1b	2	1	2	3	1a	1b	2	1a	1b	2
Product modification capabilities	●	⊖	⊖	●	⊖	⊖	⊖	1	●	⊖	⊖	●
Manufacturing capabilities	●	⊖	⬤	⬤	⊖	●	⬤	⬤	⬤	⊖	⊖	●
Supplier relationship capabilities	⬤	⬤	⊖	⊖	⊖	⊖	⊖	⊖	●	⊖	●	⬤
Customer relationship capabilities		●	⊖	⊖	⊖	⬤	1	⊖	⬤	⊖	●	⊖
Raw coverage	0.5	0.25	0.25	0.5	0.25	0.25	0.5	0.5	0.25	0.33	0.33	0.33
Unique coverage	0.5	0.25	0.25	0.5	0.25	0.25	0.25	0.25	0.25	0.33	0.33	0.33
Consistency	1	1	1	1	1	1	1	1	1	1	1	1
Solution coverage	1		1	1	1		1	1		1	1	
Solution consistency	1		1	1	1		1	1	1	1	1	

Note: ⬤ = core condition when present; ● = peripheral condition when present; ⊖ = core condition when absent; ⊖ = peripheral condition when absent; empty cells indicate indifference. Combinations marked a and b are neutral permutations: they share the same central conditions but have different peripheral condition. The columns 1a/1b since those choices are to be considered together.
Abbreviation: QCA, qualitative comparative analysis.

circles) (Fiss, 2011). Most combinations emerging from our QCA have more than one version or "permutation" (e.g., 1a, 1b), where core capabilities are the same, but peripheral capabilities differ. This means that these versions are essentially the same because the core conditions are the theoretically important aspects of the combination but have some potentially interesting practical differences due to peripheral variations.[1] We review each of the combinations for the presence and absence of each outcome, describing each combination with exemplar cases, per best practices for small-N QCA studies (Greckhamer et al., 2013).

4.5.1 | Combinations for component innovation

Overall, the combinations of capabilities related to component innovation suggest having superior supplier relationship capabilities are central to a firm pursuing component innovation, but superior manufacturing capabilities may compensate for a lack of supplier relationship

[1]We also report the coverage and consistency for each combination. Coverage denotes how much of the outcome is explained by a given combination, so a high coverage has high empirical importance. Consistency denotes how often the combination leads to the outcome of interest; thus, consistency of 1 means every instance of a given combination leads to the outcome denoted (Ragin, 2008). For example, in Table 6, the first permutation under the outcome "No Component" covers 50% of the cases leading to that outcome and is therefore more empirically important than the second or third permutations as they each have only 25% coverage. All permutations have a consistency of 1, meaning they always lead to the denoted outcome. Similarly, each solution (a run of QCA with a given outcome, such as Component Innovation) has both coverage and consistency of 1, meaning the solutions cover all cases and always lead to the denoted outcome).

capabilities under some circumstances. All three combinations for "no component innovation" have a lack of supplier relationship capabilities as a core condition, though each has another core condition that is required.

Component innovation: "Suppliers make it happen"

The first combination for engaging in component innovation has a basis in superior supplier relationship capabilities as a core and necessary condition (see Table 6, Component—Combinations 1a and 1b). Three firms fall into this combination: Fleetwood, Winnebago, and Newmar. These firms have superior supplier relationship capabilities, as they are moderately vertically integrated, emphasize collaborative purchasing models, and have codeveloped projects with suppliers. The QCA analysis here generally supports our qualitative findings connecting superior supplier relationship capabilities and component innovation.

Component innovation: "Hail Mary manufacturer"

Interestingly, the second combination for having component innovation does not center on superior supplier relationship capabilities, but instead shows a firm that has superior manufacturing capabilities, while lacking superior product modification and customer relationship capabilities, may still pursue component innovation (Table 6, Component—Combination 2). The sole firm to fit this combination is Navistar; it appears that their manufacturing skills provide sufficient knowledge to innovate at the component level and offset weaker supplier relationship capabilities. We suspect their offerings were influenced by their 2009 bankruptcy filing, in which the firm Monaco Coach was purchased by Navistar, a primary creditor. In the process of bankruptcy, they voided their warranties, alienating dealers who now had unsupported products on their lots. Given their weak position, they chose to stretch their manufacturing capabilities and attempt component innovation. Perhaps because they lack the more suitable supplier relationship capabilities, they introduced solar panels in a very small percentage of their models. Note also that Navistar also engaged in full product innovation, but these efforts were late to the market. It appears that they are willing to try whatever they could to survive and thus entered this new market.

No component innovation: "Think they know it all"

The first combination for firms not engaging in component innovation has superior manufacturing capabilities but adequate supplier relationship capabilities as core and necessary conditions (see Table 6, No component—Combination 1). This is nuanced from the preceding combination resulting in component innovation, in that the lack of supplier relationship capabilities is primary. Thor falls into this category; although, like Navistar, superior in manufacturing and adequate in supplier relationships, Thor has superior product modification capabilities, which may give them greater confidence in pursuing full product, rather than component, innovation. Thor also was in a quite different situation than Navistar: they had a strong towables division, were not facing bankruptcy, and were able to help dealers with financing, thus they had little motivation to innovate in a manner that was a poor fit for their capabilities. This QCA combination and case suggest that when lacking capabilities in supplier relationships but having superior manufacturing capabilities, a firm is unlikely to engage in component innovation.

No component innovation: "No technical collaboration"

The second combination for not engaging in component innovation has a lack of both supplier relationship capabilities and product modification capabilities as core and necessary conditions

(Table 6, No component—Combination 2). Forest River falls into this category, not pursuing component innovation during the time period studied and also lacking strong focus on supplier relationships. Suppliers in the industry have noted that Forest River's interactions with them are solely focused on getting a low price. This one-dimensional approach is unlikely to lead to collaboration between technical employees which is key to incorporating new components. This QCA combination and case suggest that when lacking superior supplier relationship and product modification capabilities, a firm will not attempt component innovation.

No component innovation: "Good downstream, not upstream"

The third combination for not engaging in component innovation has merely adequate supplier relationship capabilities, but a superior focus on customer relationship capabilities as core and necessary conditions (see Table 6, No component—Combination 3). In this case, a firm may have strong connections with customers, but weaker supplier relationships render them unable to deliver component innovations. This combination represents Tiffin, a firm where customer relationships are so important that their founder and owner still answers the customer service line. Tiffin knows its customers and what they want—but without strong supplier relationships to support their use of new components, it chooses not to pursue component innovation.

4.5.2 | Full product innovation

Supporting our qualitative exploration, both combinations for full product innovation include superior manufacturing capabilities as a core condition whereas the combinations for the lack of full product innovation indicate a lack of manufacturing capabilities. Below we discuss the nuances between the two cases of full product and the two cases of no full product innovation.

Full product innovation: "Know their stuff"

The first combination for engaging in full product innovation has a strong focus on manufacturing capabilities while lacking supplier capabilities as core and necessary conditions (Table 6, Full product—Combinations 1a and 1b). Three firms fall into this category, Thor, Tiffin, and Navistar. Note that Navistar qualifies for both 1a and 1b, so the raw coverage for these configurations show 0.5, meaning half of the four firms who did full product innovation are represented in each combination. This QCA combination and cases suggest that some firms may pursue full product innovation because they can apply their superior manufacturing capabilities to generate full product innovations may choose to do so because their merely adequate supplier relationships make component innovation more difficult and/or less likely to be successful.

Full product innovation: "Satisfy customers sustainably"

The second combination for engaging in full product innovation includes superior customer relationship capabilities as a second core condition, in addition to superior manufacturing capabilities (Table 6, Full product—Combination 2). Winnebago is the exemplar, as they have strong technical skills with dedicated employees and keep close ties with dealers, who can give them up-to-date information about customers. They were the only firm to create a full product innovation that was both early to market and long-lasting. This QCA combination and case suggests that some firms pursue full product innovation because they have confidence that they can understand what new customers will want and have the strengths in manufacturing to translate these needs into full products.

No full product innovation: "Too different to make"

The first combination for firms that did not pursue full product innovation centers on the lack of manufacturing capabilities as a core condition (see Table 6, No full product—Combinations 1a and 1b). Two firms fall into this category, Forest River and Newmar, both of which have less advanced manufacturing processes. This QCA combination and cases suggest that a lack of manufacturing capabilities may stymie any attempt to pursue full product innovation as this is significantly beyond their capabilities.

No full product innovation: "All upstream"

The second combination for firms that did not pursue full product innovation includes manufacturing capabilities as a peripheral condition, but centers on superior supplier relationship capabilities combined with the absence of customer relationship capabilities (Table 6, No full product—Combination 2). Fleetwood falls into this category, with barely adequate customer relationship capabilities, but superior supplier relationships. With their focus on lean, just-in-time manufacturing, Fleetwood keeps close contact with suppliers but, like Navistar, they also struggled with customer relationships after a crisis-induced bankruptcy, purchase by a private equity firm, and termination of their towable lines. The combination and case suggest that some firms may not pursue full product innovation because they focus on upstream suppliers, potentially at the expense of downstream dealers. They may not have a clear view of what customers want, particularly in a new, unfamiliar market. Since full product innovation is likely more complex than component innovation and requires a deeper understanding of customers, they are not able to engage in this activity.

4.6 | Summary of QCA results: Dual-purpose capabilities

From our QCA results, we see that firms with particular combinations of capabilities tend to engage in different innovation outcomes. Firms with strengths in dual-purpose capabilities seem to be better poised to deploy these capabilities dynamically, such as developing full product or component innovations for a new market. For firms that engaged in component innovation, superior supplier relationship capabilities were critical for deploying those capabilities toward developing novel "green" components, although superior manufacturing capabilities could substitute for supplier relationship capabilities if a firm was motivated enough to attempt it. For firms that engaged in full product innovation, superior manufacturing capabilities were critical for deploying those capabilities dynamically. Some firms also had strengths in customer relationship capabilities, which aided them in innovating new "green" full products.

5 | DISCUSSION

We set out to examine how dual-purpose technical and relational capabilities act as antecedents of product-based innovation, using the introduction of "green" motorhomes as a context to highlight component and full product innovation activity and explore their antecedents. We used a case study design that covered the entire population of the industry over 5 years, enabling us to synthesize and extend theory regarding relationships between firm capabilities and approaches to innovation (Edmondson & McManus, 2007; Eisenhardt & Graebner, 2007). Inductive analysis of our extensive qualitative data not only uncovered relationships between

particular capabilities and firms' engagement in different types of innovation, but also pointed to deeper interrelationships. We then used QCA to complement our findings (Lacey & Cohen, 2016), discovering combinations of capabilities that do and do not lead to different innovation outcomes.

5.1 | Theoretical contributions and implications

Our study provides several extensions and contributions to theory. First, we extend theory about capabilities by identifying four dual-purpose capabilities, which can have both ordinary and dynamic applications. We follow work by Helfat and Winter (2011), as well as Kahl (2014) and Danneels (2016) by highlighting this duality of both technical and relational capabilities. Our focus on product modification, manufacturing, supplier relationships, and customer relationships revealed differences in firms' strengths in these areas which, in turn, affected their ability to deploy these capabilities toward dynamic purposes. Our work is novel in its inclusion of multiple capabilities, as well as our varied measures of these capabilities. We posit and find that firms need superior levels of these capabilities to allow them to go beyond their ordinary application and enable them to innovate, which is a dynamic application. Furthermore, we find that these superior particular capabilities are employed in complementary or substitutive ways with other capabilities in order to engage in a particular innovation type. Together, these findings deepen our understanding of how firms leverage dual-purpose capabilities to innovate, and also open the door for future research to examine in greater depth the complementary and substitution effects of dual-purpose capabilities in dynamic applications.

Second, we distinguish between two types of product innovation: component and full product, the former involving the adaptation of an established product by using a new component, and the latter involving a completely new offering. Building on our above contribution, by distinguishing between component and full product innovations, we provide a more nuanced understanding of which combinations of technical and relational capabilities are associated with these outcomes, akin to work on complementary assets (Taylor & Helfat, 2009; Teece, 2006). We find that superior supplier relationship capabilities were most critical in supporting component innovation whereas superior manufacturing capabilities were key toward full product innovation, in combination with other dual-purpose capabilities of varying levels. Generally, firms with superior levels of these capabilities did innovate whereas those with adequate levels did not. This implies that firms can offer new products by taking different paths toward innovation, depending upon the strengths of their capabilities.

Third, we find interrelationships among the capabilities regarding product innovation and deepen our understanding of the complementary and substitution effects between dynamic and ordinary capabilities (Danneels, 2016; Schilke et al., 2018). We find that superior supplier capabilities push firms toward component innovation and away from full product innovation, but also that superior manufacturing capabilities can substitute for merely adequate supplier relationship capabilities and allow a firm to engage in component product innovation. We also find that merely adequate customer relationship capabilities pushed firms away from full product innovation but, in combination with superior manufacturing capabilities, did result in component innovation. Superior customer relationship capabilities were not sufficient toward component innovation if supplier relationships were merely adequate. However, superior customer capabilities complemented superior manufacturing capabilities toward enabling full product innovation. These findings suggest nuances and differences among these forms of vertical

partner management. Some of the deviance from our anticipated findings also seemed to result from firms' being under considerable financial and market stress; in this way, motivation and other contextual factors can influence capability deployment, highlighting the intricacies of the connections between capabilities and a firm's competitive actions (Chen, Michel, & Lin, 2021). Interestingly, we find that the strength of product modification capabilities did not have a significant effect on product innovation. This could be an artifact of our setting, in that all firms need a certain level of this capability to engage in routine new product offerings, such that variation in this capability had less influence on truly new product innovation.

Finally, another important contribution of this work is our combination of traditional qualitative methods with a QCA approach using fine-grained, context-specific capability data. This approach has been rare in strategic management (Greckhamer et al., 2018; Marx et al., 2014; Meuer & Fiss, 2020), and allows us to carefully analyze both what enables and what deters new product innovation. Product innovations are context specific and, as such, capabilities driving these innovations are also specific and require fine-grained, unique measures to truly understand this phenomenon. Obtaining product and firm-level data from both primary (interviews, observations) and secondary (industry trade press, firm publications) sources is key to this approach, as this improves validity and reliability (Denrell, Arvidsson, & Zander, 2004). Also applying QCA enables researchers to use a configurational lens and to understand what drives the presence and the lack of a dependent variable. This allows fuller use of the data, including the "null" observations, and helps uncover the processes and mechanisms truly contributing to an outcome (Lacey & Cohen, 2016). In the innovation context, it helps scholars understand laggard firms, which is an important but under-researched phenomenon.

5.2 | Practical contributions

For managers, our study highlights the differences between component and full product innovation, indicating each has different drivers. Our findings should motivate managers to be aware of the capabilities their firm has, and in what combinations, and utilize them for the appropriate type(s) of innovation. Our work indicates that firms need to attend to both internal development of technical skills and external relationship building. Further, this research suggests that a lack in some capabilities may be compensated for by superior capabilities in another area, which could be particularly important under conditions of constrained resources. For instance, a firm may still engage in component innovation if it lacks the requisite superior supplier relationship capabilities, if it has superior manufacturing capabilities.

5.3 | Research extensions and conclusion

Our study has some limitations that could motivate extensions and future work. Our context involved a severe economic shock for firms producing a low-technology consumer good. This shock pushed firms to innovate more dramatically than their normal product modifications, but one could explore if different catalysts would have a similar effect. We do believe that the capabilities we investigated are appropriate for our sector, and perhaps also for those that are similarly mature but require regular product modifications (e.g., fashion, food products, see Sorescu & Spanjol, 2008), but it would be informative to extend our predictions to these other settings. A key feature of our context is a dealer-based, but nonexclusive, distribution channel.

In settings with exclusive dealer networks or where other methods of distribution are used, the nature and significance of customer relationship capabilities may be different. Likewise, in a business-to-business setting, customer capabilities would likely have alternate manifestations and effects. In our context, suppliers are an important source and partner toward product innovation, particularly involving components. In settings with less supplier influence, the importance of the supplier relationship capability may be less pronounced. Furthermore, in a higher technology, more rapidly changing context, it may be that product development or other technological capabilities are more important for product innovations, such as fast fashion (Cachon & Swinney, 2011). Finally, our work also focused on product innovations, though one could extend our predictions to service innovations, for which differences may be more difficult to distinguish than the component and full product types.

Although we can observe some temporal variation in our data, we were not able to truly understand the impact of time. We do see that some firms entered the market with product innovations earlier than others, and that some entered later. We also observed that some innovations were sustained over time, whereas others lasted briefly. There may have also been some sequencing of innovations that we were unable to fully investigate. Relatedly, we only observed the introduction of the innovations, not how successful they were in the market or to the firm. Future, longitudinal studies with more firms and more products could be a way to better understand these temporal influences and related performance implications.

A further limitation of our data is our relatively coarse measures of capabilities. We do not delve into fine-grained routines, nor do we consider how or what type of individuals are involved in the execution of the activities related to each capability. Fruitful extensions could consider these micro foundational aspects of dual-purpose capabilities to better understand when they are developed to be superior, as compared to adequate, as well as to understand the mechanisms by which they work together to stifle or promote innovation. It would also be informative to consider the connections between these capabilities and the broader set of complementary assets and their linkages (Taylor & Helfat, 2009).

In conclusion, this paper adds to the literature connecting product innovation and dual-purpose capabilities, deepening our understanding of how combinations of specific technical and relational capabilities drive component and full product innovation. We hope we stimulate further conversations about dual-purpose capabilities that affect different types of innovation.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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