Universal Journal of Financial Economics
https://ojs.wiserpub.com/index.php/UJFE/

UNIVERSAL WISER PUBLISHER

Research Article

# Radical and Incremental Innovations as Critical Leveragers of a Firm's Financial Performance: Best Practices from Tesla and Toyota

**Boniface Okanga***

The Business School, Edinburgh Napier University, 9 Sighthill Ct, Edinburgh EH11 4BN, Scotland, United Kingdom
E-mail: boniokanga@gmail.com

**Received:** 13 August 2022; **Revised:** 9 September 2022; **Accepted:** 30 September 2022

**Abstract:** Even if the rippling effects of radical and incremental innovations often bolster a firm's overall effective financial performance, managing all kinds of innovation activities is often not a linear process that induces the desired outcome and profitability levels. Thus, given the high rivalrism in the global car market, this paper offers a critical analysis of Tesla and Toyota's radical and incremental innovation management strategies so as to extract the best practices that can be emulated by other innovation ventures to bolster their competitiveness and financial performance. Methodology used in such analysis entailed a systematic review and synthesis of the existing online data, academic journals and textbooks on Tesla and Toyota's radical and incremental innovation management strategies. Combined with the interview of twenty personnel from car dealers in Aberdeen, Edinburgh and Glasgow in Scotland about their perceptions of Tesla and Toyota's innovative products, outcomes of such systematic review were triangulated with the core radical and incremental innovation management theories to discern how they offer coherent explanation of Tesla and Toyota's innovation space and management strategies. Though Tesla and Toyota seem to use similar radical and incremental innovation management strategies of search, select, implement and capture, Toyota was still found to have a radical product innovation disadvantage that undermines the development of better EVs to counter Tesla's premium EVs. Similarly, Tesla also has a radical process innovation deficiency that affects the development of cheaper and affordable EVs to further erode Toyota's market dominance. Given such findings, the paper highlights some of the best radical and incremental innovation management practices that can be emulated by different innovation ventures to create, deliver and capture the desired innovation values that can bolster their overall competitiveness and financial performance.

***Keywords***: Radical innovation; Incremental innovation; Financial performance; Electric vehicles; Competitive advantage; Toyota; Tesla; Firm's performance

## 1. Introduction

Rippling effects of radical and incremental innovations often leverage a firm's capabilities to thrive and remain sustainable in the increasingly more fluid and disruptive modern business landscapes. As firms attain superior market performance, it also bolsters their financial performance to spawn the overall increment of returns on invested capital (Hai, Yin, & Xiong, 2022). Such a view is attributable to the fact that radical innovation edifies the creation and introduction of completely new and different products as well as business processes, position and paradigms that also offer completely new and different values that were previously unanticipated (Tiberius, Schwarzer & Roig-Dobonb, 2020). As this enables a firm anticipate and respond to the changes in market preferences, incremental innovation also

Copyright ©2022 Boniface Okanga.
DOI: https://doi.org/10.37256/xxxx
This is an open-access article distributed under a CC BY license
(Creative Commons Attribution 4.0 International License)
https://creativecommons.org/licenses/by/4.0/

spawns the continuous improvement of the existing products, processes, position and business paradigm to create better but not different values that are responsive to the changes in market trends. All these enhance a firm's capabilities to attract and retain more customers to bolster increment in its sales, revenue and profitability.

But even if that implies radical innovation as integrated with incremental innovation bolsters a firm's sustainability, capabilities of the innovation venture to translate its ideas into outcomes that bolster its overall effective financial performance still depend on how its innovation processes are managed (Tidd & Bessant, 2021). How innovation is managed can leverage or even constrain the success of the innovation ventures. Thus, given the intensity of rivalrism in the global car-making industry, this research offers a critical analysis of Tesla and Toyota's innovation management processes and strategies to extract some of the best innovation management practices from such companies as some of the most innovative entities in the global car-making industry.

In the global car-making industry, Toyota is an historical incumbent carmaker that was founded in 1936 using a £100,000 seed capital raised by Sakichi Toyoda after the sale of his automatic loom making enterprise to a British Entrepreneur (Yuhang, Jinru & Shuning, 2021). Since then, Toyota which is still headquartered in Tokyo-Japan has engaged in several radical and incremental innovations leading to radical process innovations that introduced the Toyota Production System (TPS). TPS has emerged to radically bolster Toyota's manufacturing efficiency while also lowering costs to unlock enormous cost advantages that are not easily replicable by its rivals (Kim, 2020).

Yet as Toyota engages in more radical process innovations, it has also undertaken a series of incremental product innovations leading to the proliferation of more fuel efficient, affordable and easy to maintain gasoline cars like Toyota Prius, Corrolla, Camry, Land Cruiser and Lexus (Itsuki, 2021). These radical process innovations as accompanied with incremental product innovations have enabled Toyota to dominate the global car market for a long time. However, of recent, Tesla's entrance using its radical electric vehicles (EVs) into the global premium car market seems to have threatened Toyota's long dominance in the global car market (Joohee, 2021). The implication is that Toyota has also introduced more radical product innovations leading to the introduction of its gasoline-electric hybrids, plug-in hybrids, electric-battery and hydrogen fuel-cell vehicles as a strategy of countering Tesla's disruptive electric vehicles (EVs) (Teece, 2018).

Tesla is a radical EV innovator that seeks to replace the current gasoline automobile engines with rechargeable electric lithium-ion batteries. Tesla which is headquartered in Austin-Texas-United States was founded in 2003 by Eberhard, Tarpenning, Elon Musk, Straubel and Ian Wright. Since 2003, it has engaged in more radical and incremental innovations leading to the introduction of Roadster and Models S, 3, X and Y (Lang & Reber, 2021). With Tesla models Y and 3 topping the list of the bestselling cars in the United States in 2021, most of its rivals like Toyota are now realising that the notion of EVs that started as a mere illusion is increasingly turning into realties. As Tesla further promises to lower the costs of its EVs to even just $25000, the likes of Toyota are increasingly panicking to undertake radical EV innovations to counter Tesla gradual creep into their upstream main markets (Chokshi, 2021).

It is such contestations and innovation war that render Tesla and Toyota's innovation management processes and strategies quite interesting for analysis in this research, so as to discern the best radical and incremental innovation management practices that can be extracted for other innovation ventures to also emulate. The motive of the study is not only to highlight the best radical and incremental innovation practices, but also to evaluate how such best practices influence improved competitiveness to bolster the innovation venture's overall improved financial performance. In otherwords, the view that the combined rippling effects of radical and incremental innovations leverages a firm's financial performance and sustainability is not only evident in Tesla and Toyota's successes, but also accentuated in most of the radical and incremental innovation management theories (Kennedy, Whiteman & van den Ende, 2017; Hanning, Wenzhang & Yanga, 2021).

## 2. Literature Review

Radical and incremental innovations do not only entail product innovation, but also process, position and paradigm innovations. It also entails usage of certain critical innovation management process of search, select, implement and capture (Tidd & Bessant, 2021; Hooge, Bejean & Arnoux, 2016).

## 2.1 *Radical And Incremental Innovations*

Radical innovation is the conversion of innovation ideas into outcomes that enable a business do differently and better what it is good at doing (Tidd & Bessant, 2021). It is the extraction and conversion of completely new ideas to create innovation outcomes that offer completely different new values (Aagaard, 2017). It is a strategic process of reviewing the existing business practices, approaches and products or services to create new values that enable a business do better and differently what they are good at doing. This signifies radical innovators are often disrupters because they introduce new values that displace the existing ones (Klarin, 2019). Incremental innovation is the modification and improvement of the attributes, features and quality of the existing products to enable a business do what it is good at doing better but not differently (Kennedy et al., 2017). Incremental innovation enables a business add value to create new values, but not new values that are significantly different from the existing value offerings as it is the case with radical innovations.

As different innovation entities engage in different forms of creative destructions to reshape the business terrain to their advantage, all these enable an enterprise create, deliver and capture the desired differential values even in the midst of enormous industry and market disruptions and discontinuities (Tidd & Bessant, 2021). However, innovation is not only classified according to radical and incremental innovations, but also according to whether it is a product/service or a process, position or paradigm innovation. Product innovation may either take a radical approach to create and introduce completely new products like Tesla's electric vehicles or just an incremental approach to modify and improve the attributes, quality and features of the existing products (Perkins & Murmann, 2018).

Similarly, service innovation can be radical to create and introduce completely new services like low-cost airline and online banking systems or just incremental to modify and improve the attributes and features of the existing services (Bruce, Murthi & Rao, 2017). Process innovation is the creation and conversion of ideas into new and different (radical) or modified (incremental) approaches and methods for creating and delivering products to the market as well as the management of after sales services.

Such radical or incremental process innovations can create advantages that introduce low-cost operation, resource optimisation, efficient and waste minimization operational approaches and methods (Tiberius et al., 2020). It also led to the creation of the modern lean and six-sigma manufacturing processes, Just-in-Time, Toyota Production system, manufacturing process automation and automated self-services in supermarkets and other retail points (Jean, Chiou & Sinkovics, 2016).

A business' product and process innovations influence its position innovation that reflects how the business projects itself to the market. Position innovation is the radical or incremental branding approach that enables a business tap more values from the existing and even new markets. Position innovation entails the introduction of new or modifications of the existing marketing and promotional messages as well as demonstration of consistent commitment to not only respond, but also anticipate changes in customer needs and preferences (Bouncken, Fredrich, Ritala & Kraus, 2018). This enables a business create values that meet or even exceed customer expectations. It also bolsters a firm's radical or incremental position innovation to drive transformation and increment in sales, revenue and profitability. But as most businesses often just use product and some little aspects of process innovation, paradigm innovation tends to be ignored (Takeshi, 2022).

Paradigm innovation is the creation of radical or incremental business model that defines the uniqueness of how a business generates and combines its resources to convert its ideas into the desired innovation outcomes (Aagaard, 2017). It entails the introduction of new mental frames and thoughts that change the existing business model. This may require the adoption of a business model that encourages high level of employee creativity and autonomy, enormous R&D investment and open innovation that seamlessly integrates customers, critical partners and even competitors in the innovation ecosystem (Idris & Durmu¸ 2021). Paradigm innovation may also entail the adoption of a business process that creates superior values at moderate costs as well as continuous innovation and improvement to enable adaptation to the changes in the external business environment. However, the notion of innovation management further extends beyond radical or incremental product, process, position and paradigm innovations to even include certain strategic four stages of innovation management.

## 2.2 *Strategic Stages of Managing Innovation*

Different innovation management theories highlight different strategic stages of innovation management. Cooper's (2010) stage-gate model of innovation uses seven stages of discovery, scoping, feasibility analysis, development, validation and launch. Valdeson, dos Santos and Marcos' (2021) innovation process flows along five stages of survey, selection, resource definition, implementation and learning. In contrast, Phillips' (2006) innovation process requires idea generation, capture, evaluation, development and launch. However, Tidd and Bessant's (2021) innovation process model that highlights innovation stages of search, select, implement and capture remains the most widely used innovation process management model.

### 2.2.1 *Search*

In Tidd and Bessant's (2021) narrative, searching is the evaluation of the unfolding ecosystem trends to discern the opportunities and threats that offer ideas on the discourses that the innovation process must take. It is an idea generation stage which is informed by unfolding changes in customer needs and preferences, technology, legislations and ecological trends. Searching also entails competitors' analysis to extract, learn and imitate new ideas from their practices and products, as well as usage of Hargadon's (2005) recombinant innovation strategy to evaluate how the ideas introduced by the existing breakthrough disruptive products can be modified and combined with other ideas to offer innovation ideas on the new products that must be developed. It can also involve usage of open innovation in which lead users and customers are invited to offer innovation ideas. With a list of innovation ideas generated from the search process, Tidd and Bessant (2021) explain select to deal with the analysis and choosing of the best commercially and technologically attractive ideas.

### 2.2.2 *Select*

Select process does not rely on the commonly used financial analysis of return on investment (ROI), internal rate of return (IRR), Accounting Rate of Return (ARR) and pack-back period analysis. Such financial analysis often constrains the selection of the best ideas as most innovations tend to offer insights on commercial attractiveness to capture the market in their initial stages, but not the exact financial figures on the expected returns on investment (Hanning et al., 2021). Instead, innovators rely on a risk-taking approach that uses personal insights and believe in the extent to which the innovation outcomes would respond to the unfilled gaps and customer needs.

Innovators' select decisions are also influenced by technological and resource availability to implement the selected innovation ideas. To accomplish that, select uses methodologies like internal R&D analysis, experimentation, prototyping and open innovation in which innovation ideas are subjected to evaluations by innovation partners and customers through different online platforms to select the best innovation ideas (Liu, Chow, Zhang & Huang, 2019). Idea selection may also use Edward de Bono's (1985) Six Thinking Hats (Blue, Green, White, Red, Black & Yellow Hats) for Brainstorming, where Blue Hat sets the objectives and foundations for idea generation. Green Hat focuses on creativity vis-a-vis new options and alternatives.

White Hat encourages objectivity and neutrality to eliminate opinions and emotions that affect facts-based decision-making. Red Hat encourages emotions and personal feelings to aid idea modifications to choose the most attractive innovation paths. Black Hat focuses on criticisms to identify the shortcomings and risks of the selected ideas to enable modifications and avoidance of such risks, and Yellow Hat uses constructive thinking to identify and reconcile the values of the selected ideas with their weaknesses. Idea selection can also use Bob Eberle's (2017) SCAMPER (Substitute, Combine, Adapt, Modify, Put to another Use, Eliminate & Rearrange) Methodology to have innovation ideas substituted, combined, adapted, modified, put to another use, eliminated or rearranged. Tidd and Bessant (2021) elaborate that selection of the best ideas is followed by implement which is the translation of the innovation ideas into actual products or services, or even new processes, position and business paradigms.

### 2.2.3 *Implement*

Implement requires the establishment of relevant management structures, innovation leadership, venture champion and operational facilities. It also entails the mobilisation of the required financial resources for financing the required

production activities through usage of personal savings of innovators, or equity investment, stock market listing, bank loans and borrowing from venture capitalists or friends (Jean et al., 2016). Innovation idea implementation does not only require the recruitment of talented employees, but also creation of the environment that encourages and nurtures creativity, open innovation and collaboration with other critical partners that have the required capabilities. As this aids creation of different products from innovation ideas, Tidd and Bessant (2021) note capture to deal with the process of leveraging innovation's faster diffusion into the market for the innovation venture to attract the desired sales, revenue and profitability.

#### 2.2.4 *Capture*

Capture requires usage of aggressive marketing and promotional strategies as well as partnership with relevant distributors to aid the product's faster diffusion into the market (Seelos & Mair, 2017). Capturing is not just about selling the product to generate the desired profits, but also a learning process through which a business identifies deviations and new challenges for continuous innovation and improvement to leverage the capabilities of the venture to continue creating, delivering and capturing the desired new values (Liu, Chow, Zhang & Huang, 2019). Even if these leverage a business' competitive edge, most innovation activities are often not only incremental and less radical, but also largely product-based to the complete exclusion of process, position and paradigm innovations.

Combined with poor R&D investment, unfavourable innovative climate and lack of understanding of the critical techniques and methodologies for innovation idea search, generation, selection, implementation and capture, these often undermine the capabilities of most innovation ventures to emerge with more novel products that disrupt disrupters to leverage their overall sustainability (Strobl, Matzler, Nketia & Veider, 2020; Jean et al., 2016). It is a nexus of such challenges that lure this research to use the methodology described below to diagnose and explore relevant innovation management theories and literature vis-a-vis Tesla and Toyota's innovation management behaviours and practices so as to extract the best practices that can be emulated by other innovation ventures.

## 3. Methodology

Epistemological methodology for the study entailed usage of interpretivist paradigm as integrated with qualitative content analysis and systematic review (Matta, 2021) to evaluate Tesla and Toyota's innovation management behaviours and practices. It entailed assessing their historical evolutions to discern the unique innovation management practices and behaviours that have influenced their successes or even failures in certain instances upto the present day. Basing on Tidd and Bessant's (2021) Managing Innovation Framework, this was followed by a critical analysis of Tesla's innovation management strategies as a disrupter by mapping and critiquing its innovation space, strategy and management process using Tidd and Bessant's (2021) 4Ps (Product, Process, Position & Paradigm).

Such analysis was further accompanied by the evaluation of Tesla's innovation management process of search, select, implement and capture. Thereafter, mapping and critiquing Toyota's innovation space, strategy and management process as an incumbent was undertaken to discern how it is seeking to counter Tesla as a major disrupter. Data for such systematic review and synthesis was extracted from the existing online data, academic journals and textbooks on Tesla and Toyota's radical and incremental innovation management strategies. This was accompanied with brief interviews with twenty personnel from car dealers in Aberdeen, Edinburgh and Glasgow in Scotland to discern their realworld insights and perceptions about Tesla and Toyota's innovative products as well as their areas of successes and failures.

Outcomes of such analysis were triangulated with the core radical and incremental innovation management theories to gain insights into Tesla and Toyota's overall radical and incremental innovation spaces, strategies and management processes. However, as such analysis and the entire study were being undertaken, measures were also undertaken to improve the credibility, dependability and conformability as well as the ethical considerations of the study (Lune & Berg, 2017). In that context, the details of the findings are as follows.

## 4. Findings

Details of the findings on Tesla and Toyota's radical and incremental management processes and strategies are evaluated as follows.

### 4.1 *Tesla*

Findings imply Tesla as a disrupter is seeking to utilise its innovation space by engaging in radical and incremental product, process, position and paradigm innovations to aid its gradual creep from low market footholds to the incumbents' upstream main markets (Yuhang et al., 2021). But as it does that, mapping of its innovation space signifies it also has a weakness of radical process innovation to unlock cost advantages that can render its EVs cheap and affordable.

### 4.2 *Mapping Tesla's Innovation Space*

Mapping innovation space connotes the analysis of the extent to which the innovation venture is able to use a set of complementary strategies to explore and extend its innovation frontiers across the 4Ps of product, process, position and paradigm innovations. For product innovation, Tesla has been able to engage in radical product innovations that has totally changed and transformed the product that it offers to its clients (Joohee, 2021). Tesla as Figure 1 indicates engages in radical product innovation which is instigating a shift from the internal combustion engine vehicles to electric vehicles-EVs that are completely powered and driven by electric batteries (Cendrowski, 2017).

Even though Tesla still continues to make incremental innovations to improve the different versions of its EVs, its product innovation was radical rather than incremental (Xiaofei & Bingcan, 2021). This is because it not only introduced EVs that use rechargeable electric lithium-ion batteries that are also faster than gasoline drive vehicles, but also introduced EVs that are cheaper to maintain as compared to gasoline vehicles. EVs may have a higher initial purchase costs, but maintenance costs tend to significantly reduce as it does not require frequent changes of transmission fluids, coolant and engine oil like it is in the case with internal combustion engines.

Yet, as Tesla engages in such radical product innovation, it has also explored its innovation space to engage in process innovation to use radically new ways and systems to create and deliver its electric vehicles (Furr & Dyer, 2020). Tesla's process innovation has not been incremental, but radical to create and introduce a novel automobile engineering process through which vehicles are created to be powered by rechargeable lithium-ion batteries as contrasted to gasoline automobiles that rely on internal combustion of gas (Chronowski, McGrath & Skelton, 2017).

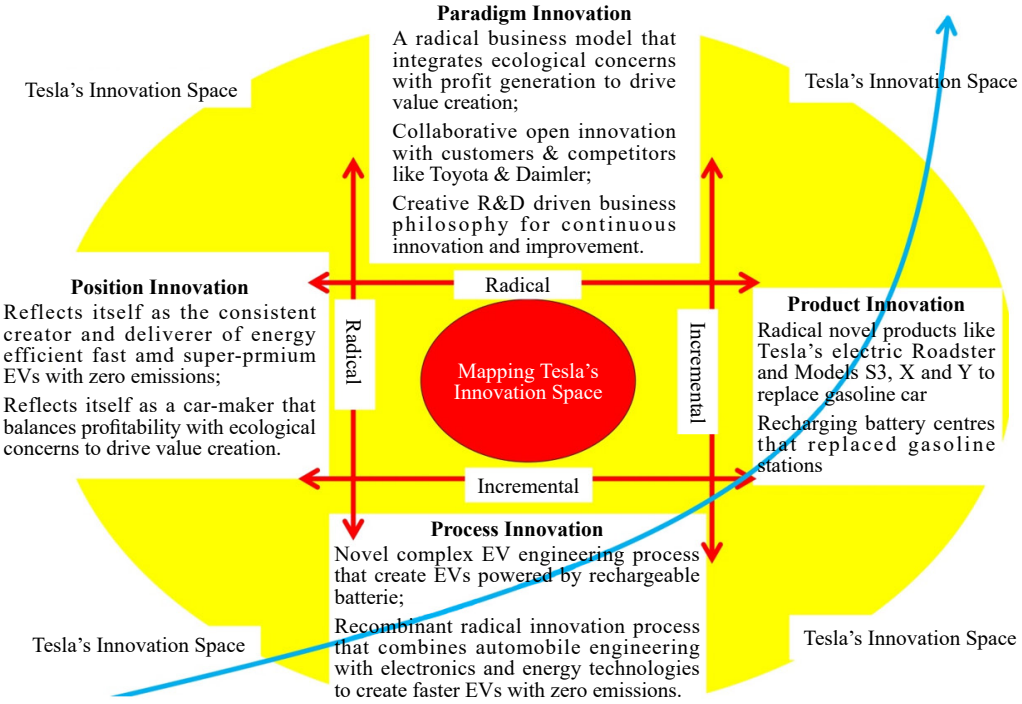


**Figure 1.** Mapping Tesla's Innovation Space using Tidd and Bessant's (2021) 4Ps

As this reduces the overall level of emissions to aid compliance with the overall level of global emission standards, the novelty of Tesla's automobile engineering process is also reflected in its EVs that are created to be faster and to produce high torque from the start (Kim, Paek & Lee, 2022). This disadvantages the less efficient combustion engines that produce not only high emissions, but also tend to have torques that gain only after speeding.

This implies although Tesla has not yet disclosed the engineering processes for manufacturing its EVs, the overall complexities of EVs still signify Tesla has engaged in some form of radical process innovation to create EVs that have revolutionised the entire global car-making industry (Xiaofei & Bingcan, 2021). Even if that also suggests Tesla's process innovation has been radical, it is still important to point out that Tesla's radical process innovation is yet incomplete to lower the overall costs of EVs as compared to the less costly gasoline vehicles.

Despite cutting off the middlemen to deliver directly to consumers through online ordering and purchases, Tesla still experiences high automobile engineering and manufacturing costs (Chowdhury, 2019). This renders it unable to displace cost-efficient automobile manufacturers like Toyota to reshape the existing automobile manufacturing industry to its favour through usage of more cost efficient radical process innovations to create relatively affordable EVs. That implies in its innovation space, Tesla must still pursue more incremental or even radical process innovations to lower the costs of its EVs (Liua & Zhan, 2017).

Though that is a weakness that Tesla must still deal with, Tesla has also been able to explore its innovation space to engage in radical position innovation in which it seeks to position itself in the minds of the consumers as the provider of energy efficient vehicles (Song, 2022). This has rendered Tesla to be viewed by customers and the world as the creator of energy efficient vehicles with zero emissions that meet the set global environmental standards and the needs of the growing numbers of environmentally conscious consumers, governments, civil societies and environmental pressure groups (Graham & Brungard, 2021). Tesla has achieved this through radical position innovation and still continues to pursue incremental innovations to position EVs to consumers as driven by quests to conserve the global environment as contrasted to internal combustion engine vehicles.

However, Tesla's radical position innovation also still remains incomplete just like radical process innovation because multiple segments of the global consumers are still less receptive to EVs due to high purchase costs. Some of the global consumers in regions without battery re-charging centres also still view EVs are unreliable since it requires

frequent recharging during long distances (Xiaofei & Bingcan, 2021). Others also view EVs as based on the technology that is yet to be tested with time and as thus are sceptical about EVs' overall efficiency as compared to gasoline vehicles.

Nevertheless, through radical product, process, position and paradigm innovations, Tesla has also reframed the underlying thinking and business models about the kind of business that it does (Tesla, 2020). Such paradigm shift is reflected in Tesla's vision statement which is "To create the most compelling car of the 21st Century by driving the world's transition to electric vehicles" (Tesla, 2022). This introduces a car manufacturing mental frame and business model based on energy efficient business philosophy, approach and strategies to reshape the business terrain which is increasingly characterised by the increasing demands for energy efficient technologies to Tesla's favour. Such a view is also echoed in Tesla's innovation management processes and strategies.

## 4.3 *Tesla's Innovation Management Process and Strategy*

Analysis of Tesla's innovation management process and strategies implies it uses radical innovation which is followed by aggressive incremental innovations to create new EVs that further position itself as the leader in the global electric car manufacturing industry. While undertaking such radical and incremental innovations, Tesla tends to use a mix of both open and closed innovation strategies (Furr & Dyer, 2020). As Figure 2 indicates, such strategies and other Tesla's strategies tend to unfold according to Tidd and Bessant's Four Steps' Innovation Management Model that encompass search, select, implement and capturing of the business values of different innovation activities and strategies.

### 4.3.1 *Search*

Search is a strategic diagnosis of the existing knowledge bases and sources to isolate not only opportunities and threats that offer sights for new innovation discourses, but also novel ideas that can be extracted to develop new product, process, position and paradigms that were previously unanticipated (Szutowski, & Szułczynska, 2017). Search may require scanning changes in the technological, market, political, legal, social and ecological trends to identify new untapped opportunities that must be tapped or threats that must be countered through novel innovations. It may also require R&D experiments, a Delphi study among specific experts, customer and competitors' data analytics and open innovations to subject a concept to public contestations so as to extract the best ideas (Bahemia, Squire & Cousins, 2017). In Tesla's search process as illustrated in Figure 2, it seems most of such methodologies are used as evidence of environmental scanning appears strong among Tesla's co-founders; Eberhard, Tarpenning, Elon Musk, Straubel and Ian Wright (Frick, 2016).

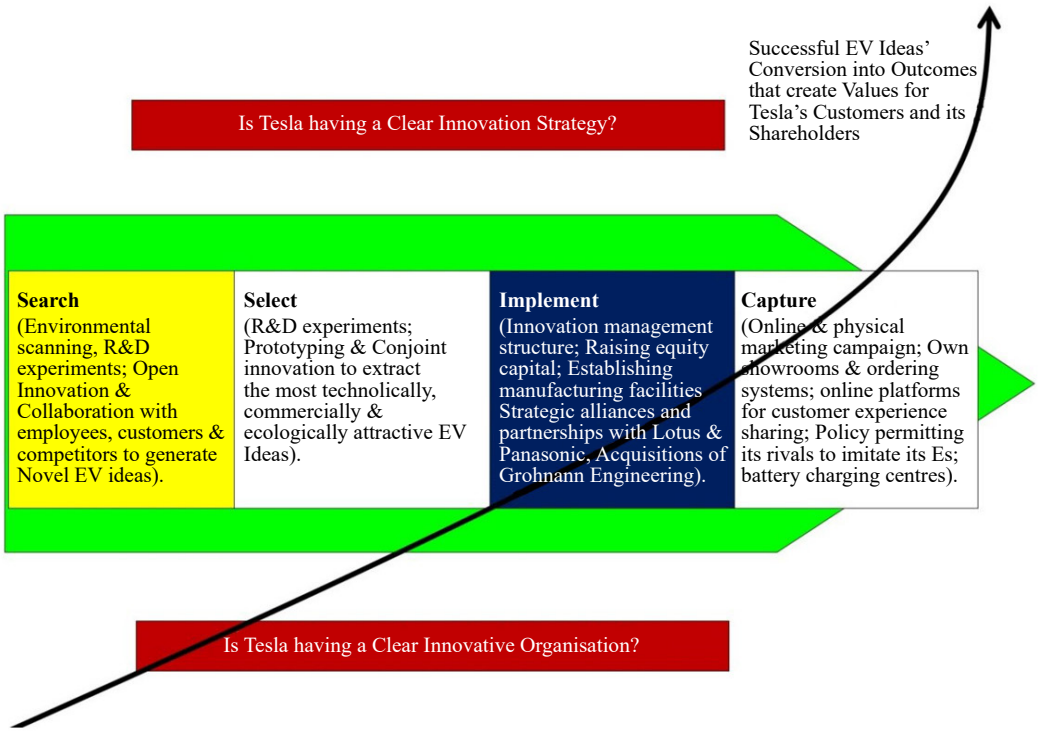


**Figure 2.** Analysis of Tesla's Managing Innovation Process and Strategy Using Tidd and Bessant's (2021) Innovation Process of Search, Select, Implement and Capture

Combined with the Tesla co-founders' learning from General Motors' failure that led to the recall of its EVI automobiles in 2003, Tesla's co-founders further got preoccupied with the scanning of legal, social and ecological trends to discern how such trends are most likely to influence technological trends in the future. In addition to the increasing demand and high costs of fossil fuel energy, the common trend in all these challenges was the stronger emphasis for clean technology, reduced emission and ecological conservation to reverse climate change (Furr & Dyer, 2020).

Due to their pre-existing tacit knowledge and background in science, engineering and technological innovations, these co-founders were able to brainstorm amongst themselves to extract the idea of electric cars that would replace gasoline automobile to significantly contribute to emission reduction (Lang, Reber & Aldori, 2021). With the search process leading to identification of the ideas of electric cars as part of the emission reducing technology, it is also evident that Tesla engages in the selection process of innovation.

### 4.3.2 *Select*

Tesla's selection process exhibits elements of open innovation since Eberhard, Tarpenning, Elon Musk, Straubel and Ian Wright were all integrated from different previous successful start-ups like Pay-pal, AC Propulsion and other tech-companies (Liua & Zhan, 2017). They engaged in conjoint innovation to craft their ideas together and discern what would be the most suitable business concept from the unfolding environmental changes. Conjoint innovation is the seamless interaction and interface between two or more innovators with different capabilities in the creation of a new product, technology, process or venture (Chang & Taylor, 2016).

As the co-founders selected electric car, Tesla's selection process still extended to the analysis of the type of electric car that would position them well in the marketplace. This led to the selection of Roadster sports car, a phenomenon that was largely influenced by Eberhard's love for fast sports car and experience in AC Propulsion, a boutique electric automaker which he had founded. As this first led to the selection of EV ideas for Roadster and subsequently Models S, 3, X and Y, Tesla also embarks on how to implement such ideas into tangible EVs (Hoang & Rothaermel, 2016).

### 4.3.3 *Implement*

Tesla's implementation of its electric car innovation project is exhibited in the establishment of the appropriate innovation management structure in which the vocal Elon Musk was appointed as Chief Executive Officer (CEO) and product architect (Liua & Zhan, 2017). Being a vocal innovation leader, Elon Musk initiated a series of funding initiatives to raise equity capital from own personal savings and venture capitalists to acquire and establish its 5.5 million square feet electric car manufacturing facility in Fremont, California in 2003. Since the facility was previously owned by Toyota and General Motors as gasoline car manufacturers, the acquisition of such a facility was a strategic decision that enabled Tesla to make only a few modifications for the facility to suit the complexity and technology of electric car manufacturing (Chowdhury, 2019).

However, in its implementation strategy, Tesla also used a combination of open innovation reflecting different forms of strategic alliances, partnerships and collaborations. One of such open innovations was reflected in Tesla's open design competition that was won by Lotus, thereby leading to a strong present day partnership between Tesla and Lotus Car Manufacturers (Joohee, 2021). In that partnership, Lotus has taken a leading role in the design of Tesla's cars. As Lotus also offers its car manufacturing plant in the UK to Tesla, it also permits Tesla's access to its supply chain networks. To further implement its EV innovation ideas, Tesla entered into strategic partnership with Panasonic for the manufacturing and supply of lithium-ion batteries and other complex electronic equipments and gadgets used in all Tesla's electric cars like Roadster and Models S, 3, X and Y (Lienert, Shirouzu & Taylor, 2020).

Although Daimler AG and Toyota later pulled out, Tesla also struck a partnership deal with Daimler in the initial stages of the implementation of its innovation ideas in order to mutually gain from each other's tacit knowledge in the development of electric drive battery systems. Following the success of Roadster sports car, Tesla partnered with Toyota in 2010 where Tesla agreed to develop the electric version of Toyota RaV4 by creating a plug-in EV in exchange for Toyota's investment of 3% ($50million) equity in Tesla Motors (Cheong, Song & Chao, 2016).

But above all these, Tesla used its vocal Elon Musk, the CEO and product architect to provide a strong innovation leadership that drums support and instils hope in the shareholders, potential investors and venture capitalists to invest in Tesla as a new car manufacturer of hope. This enabled Tesla to access a significant amount of equity capital that it used in the development of its Roadster and subsequently Models S, 3, X and Y (Lienert et al., 2020). Such enormous equity capital also enabled Tesla to acquire start-ups and established tech-companies with the requisite technological capabilities and tacit knowledge to further build capabilities to take the implementation of electric car innovation ideas forward.

In such acquisitions, Tesla acquired among others Grohmann Engineering to aid stamping die systems for providing sheet metal parts, Perbix that offers design automated manufacturing equipment, Maxwell Technologies that manufactures and sells automobile energy storage and power delivery solutions and Hibar Systems that has competencies in advanced automation systems for battery cells through a mechanised pump injection system (Awatif, Barros & Degirmenci, 2020). Certainly with the success of Roadster and subsequently Models S, 3, X and Y, Tesla is now not only building cybertrucks, but also seeking to capture more values from all its innovations.

### 4.3.4 *Capture*

Capture is a strategic process of increasing innovation's diffusion rate across the market to sustainably grow the product's performance to attract the desired sales, revenues, profitability and market share and capitalisation. Tesla seems to be doing well in terms of attempts to capture value from its innovations with the effect that Tesla sold 1 million EVs in 2021 and Tesla models Y and 3 (911, 208) topped the list of the bestselling cars in the United States. As its total revenue increased from $31.5 billion in 2020 to $53.8 billion in 2021, even in the midst of the Covid-19 pandemic, Tesla's overall market capitalisation rose to $1.06 trillion in 2021 from $86 billion in 2020 (Lang & Reber, 2021).

Although it got rated as the automobile manufacturer with the highest market capitalisation to have ever existed in the US, Tesla's market capitalisation declined in 2022 to $942.36 billion, but still remain ahead of Toyota's market capitalisation of $202 billion. All these increment in value capture is attributable to the improving quality of Tesla's EVs that are increasingly being adopted and regarded by consumers as superior to other cars (Shipley, 2020). Tesla has also established its own showrooms and online ordering systems to bypass the traditional car dealers in the conventional car manufacturing industry to deal directly with consumers.

This has enabled Tesla to directly interact with its customers to understand their needs and gain insights that can be

used to further improve its EVs. Tesla accomplishes this by offering the online platform through which consumers can share their experiences of using Tesla EVs (Shipley, 2020). This has contributed to reinforcing Tesla brands as well as their diffusion for Tesla to capture more values through increased sales and profitability even in distant markets such as Australia, New Zealand and China.

To further capture more values, Tesla has positioned its CEO, Elon Musk as the venture champion that not only goes around raising funds, but also advocating for consumers to adopt Tesla EVs. In these, he vigorously campaigns and promises the market that Tesla will even do better in future (Suchek et al., 2021). With a Twitter following of 62.5 million people, Elon Musk often engages the public directly on any issues concerning Tesla's performance and growth to capture significant media attention that has rendered it easy for Tesla to spread information about its EVs (Segal, 2020). Tesla has also adopted the open innovation policy in which it encourages its competitors in the larger automobile manufacturing industry to emulate the manufacturing of its EVs.

As more and more competitors attempt to do so, Tesla's EVs gained more market credence as the new forms of vehicles to adopt. This enabled Tesla to create and capture more values as its EVs further diffuse across the market (Teece, 2018). Tesla is also gaining from the competitors' attempt to imitate its EVs by acquiring new techniques that can be used for further incremental innovations to reshape the entire global automakers' industry to its advantage. In a quest to capture more values, Tesla increased the unrolling of its battery charging centres in conjunction with the introduction of home charging equipment.

However, even if that is the case, Tesla still faces a challenge of lowering the escalating EVs' manufacturing costs to unlock cost advantages that can enable it disadvantage Toyota, the lowest cost automobile maker in the world. The implication is that though Tesla is growing exponentially in the United States, Europe, Australia and Japan, such cost disadvantages is still constraining its growth in low income markets that Prahalad (2006) phrases as the lucrative bottom of the pyramid.

## 4.4 *Toyota*

Yet, as Tesla faces cost constraints, mapping of Toyota's innovation space as the dominant market incumbent signifies it is increasingly using such cost barriers to lockout Tesla from gradually creeping into its upstream main markets.

## 4.5 *Mapping Toyota's Innovation Space*

Mapping Toyota's innovation space implies Toyota has been exploring both incremental and radical product, process, position and paradigm innovations to sustain its leadership in the global auto-making industry (Chowdhury, 2019). However, most of its product innovation strategies have been largely incremental not until recently that it engaged more in radical automotive innovations to create hybrid electric vehicles to counter Tesla's emerging disruptive activities. In terms of its incremental product strategies, Toyota has also been a rationalist by focusing on analysing the changes in the external environment and making significant continuous incremental improvement to enable them do better what they are good at doing (Baron, 2020; Simnica, 2022).

Effects of such approach as Figure 3 indicates have been reflected in the development of fuel efficient and easy to maintain vehicles like Toyota Prius, Corrolla, Camry, Land Cruiser and Lexus that are also produced using lighter body materials like aluminium, sub-standard steel, cooper and rubber. As this spurred Toyota's innovation leadership as the lowest cost automaker in the gasoline car-making industry, Toyota has also been caught in the innovation followership by exploring radical product innovations to counter Tesla's increasing creep into its mainstream upmarkets (Llanes, 2019). This induced the production of hybrid electric vehicles, plug-in hybrids and electric battery vehicles that switch from internal combustion to electric mode as the vehicle gains momentum and speed.

These are accompanied with the production of hydrogen fuel-cell vehicles which is also a radical product innovation because hydrogen fuel-cell vehicles like Toyota Mirai are designed to use hydrogen fuel and not the usual gasoline (Tomlins, Oksana, Sukumar, Rao, & Pandya, 2021). But even if Toyota has intensified its radical product innovations to produce EVs, it has still failed to counter Tesla's increasing disruption in the automobile industry. This promoted Takeshi, Toyota's Vice-Chairman to express frustration in 2012 that whether it is in terms of speed, cost and electric battery power length, current EVs do not meet the need of the contemporary consumers.

As this reflects a mindset, path-dependency and established assumptions that can frustrate radical product innovations, Toyota also indicated that it will be concentrating mainly on hybrids and hydrogen fuel-cell autos (Tomlins et al., 2021).

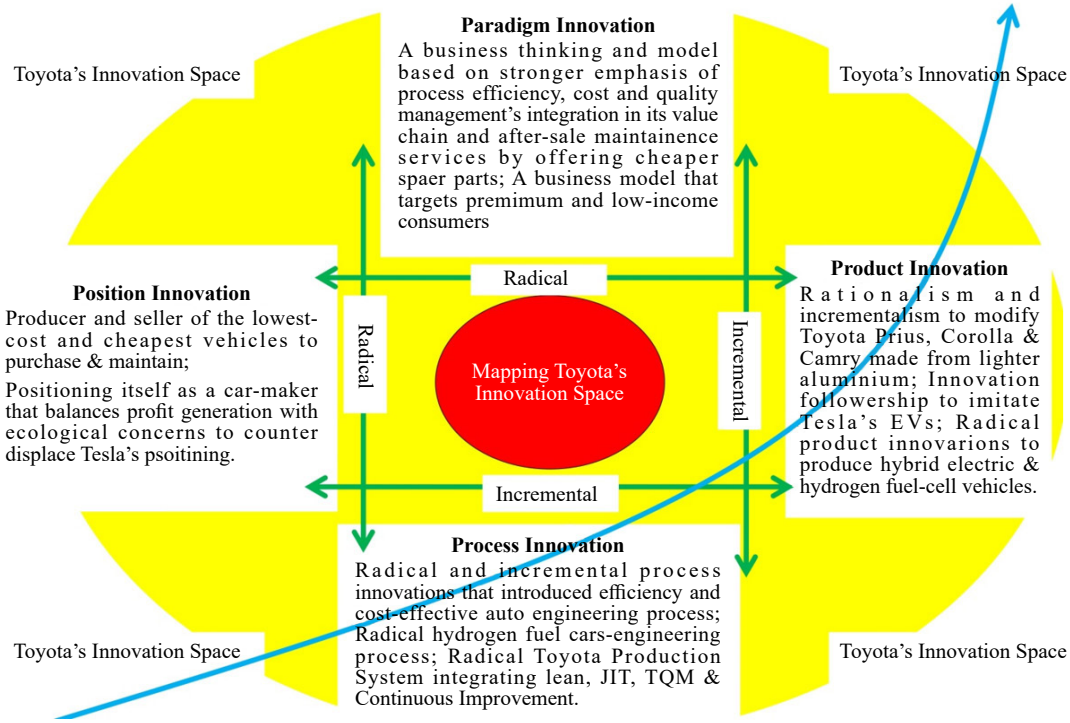


**Figure 3.** Mapping Toyota's Innovation Space Using Tidd and Bessant's (2021) 4Ps

Despite limitations in its radical product innovation, mapping of its innovation space implies Toyota has been and is still the innovation leader in radical and incremental process innovation. This leverages the efficiency and cost-effectiveness of all its auto-manufacturing processes.

One of such radical process innovations is reflected in the introduction of the Toyota Production System reflecting a mix of lean manufacturing, just-in-time, kaizen-continuous improvement, evaluate and correct, problem-solving, teamwork, Total Quality Management and Jidoka-automation integrated with human touch (Gary, Vaghefi & Deusen, 2003 as cited in Boudette, 2018).

This radical process innovation has enabled Toyota to not only do what they do differently, but also to incrementally do what they do better by producing and offering the lowest-cost and affordable automobiles. The effect is that since its existence from 1936, Toyota has been the lowest cost automobile producer, thereby beating inter alia Ford, General Motors, Volkswagen, Mercedese Benz and Volvo (Nkomo, 2022). This even prompted Tesla to strike a deal with Toyota for the manufacturing of electric RaV4 in 2010 so as to learn from their tacit knowledge and competencies in process efficiency and cost-effectiveness (Ledbetter, 2018).

Yet, as Toyota undertakes radical and incremental product and process innovations, mapping of its innovation space further signifies Toyota is also able to radically position itself in the entire global market as the producer and seller of the lowest and cheapest vehicles that are also easy to maintain (Wu et al., 2018). All these have also radically framed Toyota's paradigm innovations to reflect a business model pitching Toyota as the lowest-cost auto-manufacturing leader that consistently strives to produce and deliver cheap and affordable vehicles (Stewart, & Raman, 2007). This enables Toyota meet the needs of not only the high income segments, but also low income groups to tap what Prahalad (2006) calls "fortune at bottom of the pyramid".

But even if that is the case, Toyota will still have to undertake more radical product and process innovations to unlock other inimitable cost-advantages since following the entry of the more radical innovative Tesla, all is no longer the same. This is because Tesla promises to undertake more radical and incremental product and process innovations to lower costs and deliver EVs at just $25000 or even lower in the near future (Toyoda, 2022). In otherwords, despite Toyota's leadership in product, process, position and paradigm innovations, Tesla is constantly trying to reshape the automakers' industry to its advantages. And that has prompted Toyota to initiate and adopt a mix of different innovation management processes and strategies.

## 4.6 *Toyota's Innovation Management Process and*

Innovation strategy connotes a set of critical actions reflecting how a venture carefully selects and combines its resources to generate novel ideas that are translated into products or services that create the desired values for the enterprise (Stadler, 2011). Besides rationalism, innovation strategies can be incremental or radical, or even a combination of all. And Toyota seems to be using all by applying rationalism to evaluate the unfolding trends to undertake incremental modifications to sustain its industry leadership, while also undertaking radical and discontinuous innovations to counter new disruptive entrants like Tesla (Monden, 2019).

As Toyota uses incremental innovation to introduce hybrid electric vehicles, plug-in hybrids and electric battery vehicles that switch from internal combustion to electric mode during high speed, it also uses radical innovation to introduce hydrogen fuel-cell vehicles and EVs to counter Tesla's disruption and sustain its industry leadership (Liua & Zhan, 2017). In Toyota's use of such rationalism, incrementalism and radicalism, Figure 4 implies its overall process of innovation management seems to unfold along Tidd and Bessant's (2021) Four Steps' Model for innovation management that include search, select, implement and capture.

### 4.6.1 *Search*

At Toyota, its search has often entailed environmental scanning to track changes in consumer tastes and preferences to inform product innovations and modifications that respond to such changes (Liua & Zhan, 2017). Toyota also interacts with competitors like when it did in the 1950s with Ford and in 2010 with Tesla to learn and generate insights that can be used in its product and process innovations (Liker & Franz, 2011). With Ford, Toyota was able to extract ideas that informed its product and process innovations to create cost advantages that placed it above Ford and other competitors. Toyota also relies on its R&D to search and generate an array of ideas that often influences its innovation dimensions (Monden, 2019). In addition to using its own employees and customers to generate different innovation ideas, Toyota also tends to use a mix of different selection methodologies to extract the best ideas after the search process.

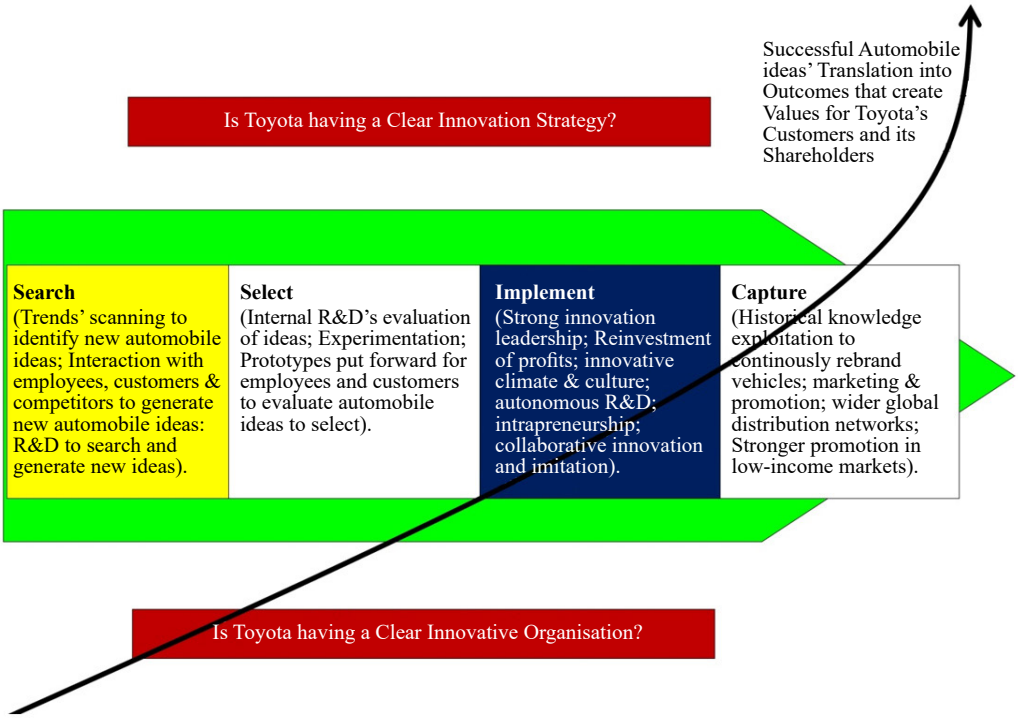


**Figure 4.** Analysis of Toyota's Managing Innovation Process and Strategy Using Tidd and Bessant's (2021) Innovation Process of Search, Select, Implement and Capture

### 4.6.2 *Select*

Select is the opportunity cost of choosing the most technologically and commercially attractive ideas that would create the desired values. Toyota's innovation idea selection process often entails the use of prototypes that are evaluated by customers and its R&D Division to select the most technologically and commercially attractive innovation idea (McMillan, 2018). It also relies on experimentation like when it first exported its pickup trucks to the US market only for the trucks to be criticised for being slow to thereby pave way for further innovation to build more efficient and fast trucks (Chowdhury, 2019).

Similarly, Toyota also partnered with Tesla to build an electric RaV4 as the experimentation and learning process that sought to test whether EV ideas are technologically and commercially viable. Following, the partnership's disintegration, Toyota scaled its production of hybrid electric vehicles and introduced the hydrogen fuel-cell vehicles to signify it had already gained insights and reached a decision on the innovation path to undertake (Itsuki, 2021). This also signifies after search and select, Toyota also tends to follow Tidd and Bessant's next step of innovation idea implementation.

### 4.6.3 *Implement*

Implement is the translation of innovation ideas into actual products or services that create the desired value for the enterprise. For Toyota, it emphasises strong innovation leadership reflecting family members that share similar vision and values to steer the translation of its innovation ideas into superior vehicles that create the desired values. Beginning with the seed capital of £100,000 that was raised from the sale of the automatic loom making plant to establish its first car manufacturing in 1936, Toyota has always reploughed its generated profits to finance the implementation of different successive innovations (Takeuchi, Osono & Shimizu, 2008). This is reflected in the translation of its innovation ideas into the manufacturing of its hybrids, EVs and hydrogen fuel-cell vehicles that are being financed by the reploughed profits from previous successful innovations.

To also ensure its innovation processes are not sabotaged by employees, Toyota has created a highly innovative

climate and culture among employees and managers. It further has the largest independent and autonomous R&D Lab which is not subjected to the financial whims of Internal Rate of Return or Net Present Value analysis that often suffocate the translation of innovation ideas into the desired tangibles and intangibles. To translate its ideas into new products, Toyota created a strong linkage and corporate intrapreneurship among Toyota Motor Corporation, JTEKT, Auto-Body, Aichi Steel and Toyota Industries as its integrated entities (Itsuki, 2021).

In such initiatives, it uses collaborative innovation with partners and competitors as it did with Ford and Tesla to build and improve its capabilities to translate certain complex novel innovation ideas like EVs into realities. Through such processes, Toyota uses learning and imitation not only to translate its innovation ideas into realities, but also to gain insights for further incremental improvements that can create a unique version of its products or processes. As it is such capabilities that Tesla must watch, it is also through a mix of these innovation implementation approaches that Toyota has been able to capture enormous values.

#### 4.6.4 *Capture*

IEven if the combined rippling effects of radical and incremental innovations often bolster a firm's overall effective performance, this study implies managing all kinds of innovation activities is often not a linear process that induces the desired outcomes. The implication is that as some incremental innovations are often disguised as radical when they are actually incremental, some radical innovations that introduce new products are often also not accompanied with incremental innovations to leverage the sustainability of the newly created products. Such laxity is reflected in the fact that although Toyota was a radical innovator, its reluctance to undertake further radical and incremental innovation to proactively explore all its innovation space created space for Tesla's entrance.

Thus, given the high rivalrism in the global car-making industry and market, this paper offers critical radical and incremental innovation management insights and best practices that can be emulated by other innovation ventures. Though Tesla and Toyota seem to use similar radical and incremental innovation management processes and strategies of search, select, implement and capture, Toyota was still found to have a radical product innovation disadvantage that undermines the development of cheaper and better EVs to counter Tesla EVs. Similarly Tesla also has a radical process innovation deficiency that affects the development of cheaper and affordable EVs to further erode Toyota's market dominance.

To counter each other and perform better in the midst of a healthy competition, Tesla must adopt a more radical process innovation to create cheaper EVs that are affordable to all income groups to further catalyse EVs' diffusion and transformation of the auto-making industry from gasoline engines to zero emission EVs. It must also undertake further incremental innovations to lower the costs of some of the materials used in the making of the EV bodies and for the quality of its electric batteries to last longer without recharging under all circumstances. Tesla should consider using strategic partnership to aid the faster establishment of electric battery recharging centres across the United States, European, Japanese and Chinese markets that are increasingly embracing EVs.

Since Toyota has a competitive advantage in the production of gasoline and gasoline-electric hybrids, it must instead undertake more radical product innovations to unlock its capabilities to build better EVs that can counter Tesla's disruptive EVs. In such quests, it should also modify its path-dependencies that influenced its market success for a long time by introducing more radical and incremental changes that support the creation of superior EVs. Finally, Toyota must also scale its investment in hydrogen fuel-cell cars or another rival just like Tesla did may emerge to do it differently and even better than they are currently doing.

## 5. Discussion

Even if the combined rippling effects of radical and incremental innovations often bolster a firm's overall effective performance, this study implies managing all kinds of innovation activities is often not a linear process that induces the desired outcomes. The implication is that as some incremental innovations are often disguised as radical when they are actually incremental, some radical innovations that introduce new products are often also not accompanied with incremental innovations to leverage the sustainability of the newly created products. Such laxity is reflected in the fact that although Toyota was a radical innovator, its reluctance to undertake further radical and incremental innovation to

proactively explore all its innovation space created space for Tesla's entrance.

Thus, given the high rivalrism in the global car-making industry and market, this paper offers critical radical and incremental innovation management insights and best practices that can be emulated by other innovation ventures. Though Tesla and Toyota seem to use similar radical and incremental innovation management processes and strategies of search, select, implement and capture, Toyota was still found to have a radical product innovation disadvantage that undermines the development of cheaper and better EVs to counter Tesla EVs. Similarly Tesla also has a radical process innovation deficiency that affects the development of cheaper and affordable EVs to further erode Toyota's market dominance.

To counter each other and perform better in the midst of a healthy competition, Tesla must adopt a more radical process innovation to create cheaper EVs that are affordable to all income groups to further catalyse EVs' diffusion and transformation of the auto-making industry from gasoline engines to zero emission EVs. It must also undertake further incremental innovations to lower the costs of some of the materials used in the making of the EV bodies and for the quality of its electric batteries to last longer without recharging under all circumstances. Tesla should consider using strategic partnership to aid the faster establishment of electric battery recharging centres across the United States, European, Japanese and Chinese markets that are increasingly embracing EVs.

Since Toyota has a competitive advantage in the production of gasoline and gasoline-electric hybrids, it must instead undertake more radical product innovations to unlock its capabilities to build better EVs that can counter Tesla's disruptive EVs. In such quests, it should also modify its path-dependencies that influenced its market success for a long time by introducing more radical and incremental changes that support the creation of superior EVs. Finally, Toyota must also scale its investment in hydrogen fuel-cell cars or another rival just like Tesla did may emerge to do it differently and even better than they are currently doing.

## 6. Significance and Managerial Implications

Findings of this research imply radical and incremental innovations are not only critical for leveraging the competitiveness of the contemporary car-makers, but also for leveraging their financial performance. It enhances continuous innovation and product improvements that enable firms to consistently respond to the changes in market needs and preferences. This enables businesses attract and retain more customers to catalyse the overall increment in sales, revenue and profitability. Such a view is accentuated in the fact that due to the increasing market diffusion of Tesla's EVs, its total revenue increased by 70.67% from U$31.536B in 2020 to U$53.823B in 2021 (Tesla, 2022).

Though Toyota had a turnover of U$245B in 2021, Tesla still had a higher market capitalization of U$1.061 trillion in 2021 as compared to Toyota's U$254B due to the improving investors' confidence about Tesla's radical innovation successes (Toyota, 2022; Tesla, 2022). Because of the high level of radical and incremental innovations, Toyota also beats Daimler that had a turnover of U$176.46B in 2021 though Daimler's focus is often premium car segment as contrasted to Toyota that targets the low income car segment (Daimler, 2022). Similarly due to high radical and incremental process innovations that lower operational costs, Toyota also beats KIA Motors that had a turnover of U$50.61B in 2021 and BMW that had U$111.24B in 2021 (KIA, 2022; BMW, 2022). In that context, it is suggested in Figure 5 that for radical and incremental innovations to induce the desired competitive advantage and financial performance, some of the best practices would require the development of a web of collaborators, strategic alliances and partnerships of corporate intrapreneurs with product designers, developers, suppliers, customers, distributors, wholesalers, retailers and competitors in the innovation idea search, selection, implementation and capture.

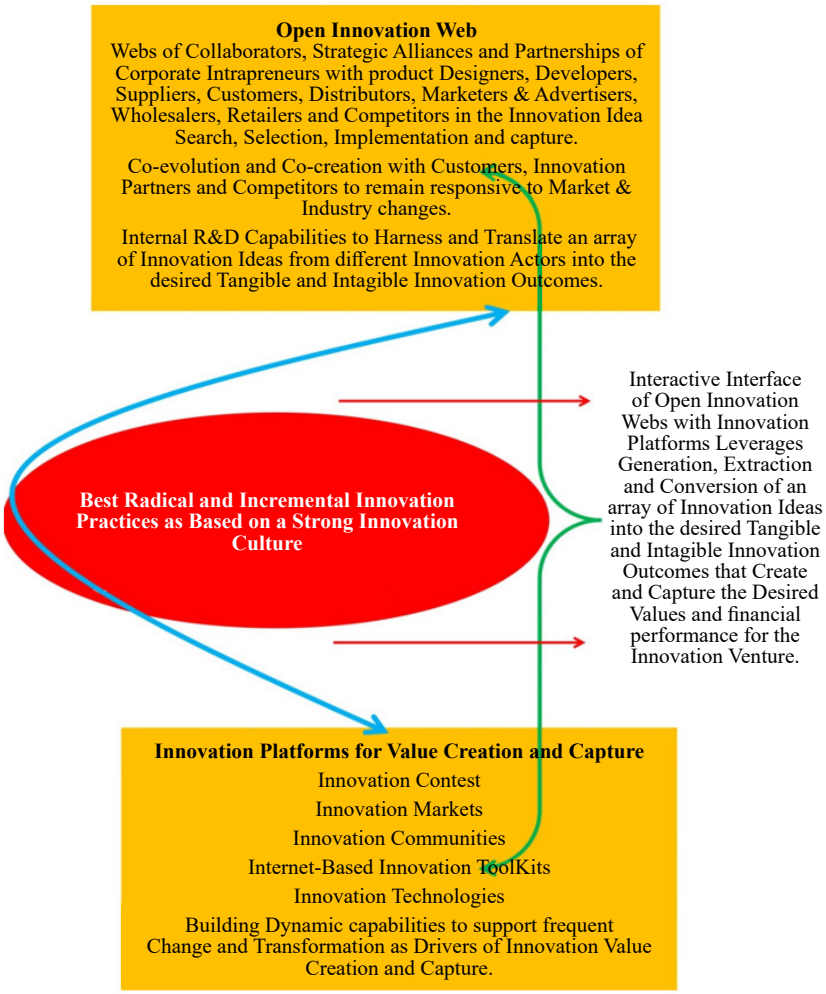


**Figure 5.** Analysis of Toyota's Managing Innovation Process and Strategy Using Tidd and Bessant's (2021) Innovation Process of Search, Select, Implement a

These must be accompanied with engagement in co-evolution and co-creation with customers, innovation partners and competitors to respond to the changes in market and industry trends. However, in such complex open innovation web, it is the internal R&D capabilities to harness and translate an array of innovation ideas from different innovation actors into the desired tangible and intangible innovation outcomes that influence the success of an innovation venture to create and capture the desired values.

As Figure 5 further indicates, it is the interface of the actors and players in such open innovation web with the innovation platforms like innovation contests, innovation markets, innovation communities, internet-based innovation toolkits and innovation technologies that leverages the capabilities of the innovation actors and players to create and capture the desired values. All these must be built on a strong innovation culture to enable the innovation venture realize improved competitive advantage and financial performance from their radical and incremental innovations.

In that process, innovation contests engage customers and autonomous innovators to contribute ideas. Innovation markets engage actors that announce problems and actors that propose innovation solutions. Innovation communities reflect collaborators, partners, suppliers and rivals. To sustainably create and capture the desired values, building dynamic capability to support frequent change and transformation as a driver of innovation value creation and capture is a prerequisite for the innovation venture's sustainable success and financial performance.

However, though this study conclusively implies radical and incremental innovations leverage the financial performance of innovation ventures, future research can still explore how creating and inculcating an innovative

enterprise culture can bolster a firm's overall financial performance.

## Acknowledgement

Great thanks and gratitude to The Business school, Edinburgh Napier University-Scotland for availing the resources and support that rendered this research a success.

## References

Aagaard, A. (2017), "Facilitating radical front-end innovation through targeted HRM practices: A case study of pharmaceutical and biotech companies". *Journal of Product Innovation Management,* Vol. 34 No. 4, pp. 427–449.

Ailawadi, K. L. and Farris, P. W. (2020), Getting Multi-Channel Distribution Right, *Wiley & Sons,* London, UK, pp. 94–115.

Awatif, A.l., Barros, A. and Degirmenci, K. (2020), "Resource integration in a vehicle ecosystem", Proceedings of the 55th Hawaii International Conference on System Sciences, 2022.

Bahemia, H., Squire, B. and Cousins, P. (2017), "A multi-dimensional approach for managing open innovation in NPD", *International Journal of Operations & Production Management,* Vol.37 No.10, pp. 1366–1385.

Baron, D.P. (2020), "Vertical differentiation, product innovation, and dynamic competition", *Journal of Economics & Management Strategy,* Vol.29 No.2, pp. 635–662.

Bhattacheryay, S. (2021), "Multinational working capital management a study on Toyota Motor Corporation", *International Journal of Finance & Economics,* Vol. 2 No. 1, pp. 1–21.

BMW. (2022). Annual Report. Munich: BMW, Available at: https://www.bmwgroup.com/content/dam /grpw/websites/bmwgroup_com/ir/downloads/en/2022/q2/BMW_Q2-2022_EN.pdf (Accessed on 28 July 2022).

Boudette, E.N. (2018), "Toyota and Mazda Choose Alabama for $1.6 Billion Car Plant", *New York Times Magazine,* Available at: https://www.nytimes.com/2018/01/10/business/toyota-mazda-plant-alabama.html (Accessed on 28 June 2022).

Bouncken, R. B., Fredrich, V., Ritala, P. and Kraus, S. (2018), "Coopetition in new product development alliances: Advantages and tensions for incremental and radical innovation. *British Journal of Management*", Vol. 29 No. 3, pp. 391–410.

Bruce, N. I., Murthi, B. P. S. and Rao, R. C. (2017), "A dynamic model for digital advertising: The effects of creative format, message content, and targeting on engagement", *Journal of Marketing Research,* Vol. 54 No. 2, pp. 202–218.

Cendrowski, S. (2017), "Tesla Makes A U-Turn In China", *Fortune,* Vol.12, No. 1, pp. 127–137.

Cheong, T., Song, S.H. and Chao, H. (2016), "Strategic alliance with competitors in the electric vehicle market: Tesla Motor's case", *Mathematical Models for Supply Chain Management,* Vol. 16 No.2, pp. 149–166–182.

Chokshi, N. (2021), "Elon musk promises to make a $25,000 Tesla (in 3 Years)", New York, New York Times, April 26, 2021, available at: https://www.nytimes.com/2020/09/22/business/tesla-elon-musk-battery-day.html (Accessed on 13 May 2022).

Chronowski, L., McGrath, J., & Skelton, J. (2017), "Tesla Takes on Michigan in Its Fight to Sell Directly to Consumers", *The licensing Journal,* Vol. 9, No. 4, pp. 16–18.

Cooper, R.G. (2010), The Stage-Gate Product Innovation System, *Wiley,* Sussex, UK, available at: https://www.researchgate.net/publication/313967359 (Accessed on 13 May 2022).

Chang, W. and Taylor, S. A. (2016), "The effectiveness of customer participation in new product development: A meta-analysis", *Journal of Marketing,* Vol. 80 No.1, pp. 47–64.

Chowdhury, M.A. (2019), "An analysis on competitive strategies of electric vehicles in Japan and China", *Journal of Law and Political Science,* Vol. XLVI No. 3, pp. 43–62.

Daimler. (2022). Annual Report and Financial Performance. Stuttgart: Daimler, available at: https://www.daimlertruck.com/documents/investors/reports/interim-reports/daimler-truck-ir-interim-report-q1-2022.pdf (Accessed on 28 June 2022).

de Bono, E. (1985), Six Thinking Hats, Pearson, New York, NY, pp. 16-29.

Eberle, B. (2017), "SCAMPER (substitute, combine, adapt, modify, put to another use, eliminate & rearrange) technique", *Knowledge Solutions,* Vol. 2 No. 1, pp. 19–32.

Frick, W. (2016), “Tesla, autopilot, and the challenge of trusting machines”, Harvard Business Review, Boston, Mass, available at: https://hbr.org/2016/07/tesla-autopilot-and-the-challenge-of-trusting-machines (Accessed on 13 May 2022)

Furr, N. and Dyer, J. (2020), “Lessons from Tesla’s approach to innovation”, Harvard Business Review, Boston, Mass, available at: https://hbr.org/2020/02/lessons-from-teslas-approach-to-innovation (Accessed on 16 May 2022).

Gary, R.F., Vaghefi, R. and Deusen, C.V. (2003), “Competitive advantage the Toyota way”, *Business Strategy Review,* Vol. 14 No. 4, pp. 49–62.

Graham, J.D. and Brungard, E. (2021), “Consumer adoption of plug-in electric vehicles in selected countries”, *Future Transportation,* Vol. 1 No. 2, pp. 303–325.

Hai, B., Yin, X., & Xiong, J. (2022), “Could more innovation output bring better financial performance? The role of financial constraints”, *Finance & Innovation,* Vol. 8, No. 6, pp.144–188.

Hanning, S., Wenzhang, S. and Yanga, Z. (2021), “Radical or incremental: which type of innovation do stock options drive?”, *Technology Analysis & Strategic Management,* Vol. 3 No. 19, pp. 314–332.

Hargadon, A. 2005. Technology brokering and innovation: linking strategy, practice, and people. *Strategy & Leadership,* 33(1), 32–36.

Hoang, H. and Rothaermel, F.T. (2016), “How to manage alliances strategically: Why do so many strategic alliances underperform — and what can companies do about it?”, Boston: *MIT Sloan Management Review,* available at: https://www.coursehero.com/file/150809494/Stategic-Alliancespdf/ (Accessed on 16 May 2022).

Hooge, S., Bejean, M. and Arnoux, F. (2016), “Organising for radical innovation: The benefits of the interplay between cognitive and organisational processes in KCP workshops”, *International Journal of Innovation Management,* Vol. 20 No.4, pp. 249–273.

Idris, M.C. and Durmu¸ S.G.A. (2021), “Innovation management systems and standards”, *A Systematic Literature Review and Guidance for Future Research,* Vol.13 No.2, pp. 81–101.

Itsuki, H. (2021), “Evaluation on changes of strategy and strategic direction in Toyota motor company in Japan”, *Journal of Strategic Management,* Vol. 5 No. 1, pp. 20–29.

Jean, R.J. B., Chiou, J.S. and Sinkovics, R. (2016), “Interpartner learning, dependence asymmetry and radical innovation in customer–supplier relationships”, *Journal of Business & Industrial Marketing,* Vol. 31 No.6, pp. 732–742.

Joohee, H. (2021), “How does Tesla motors achieve competitive advantage in the global automobile industry?”, *Journal of Next-generation Convergence Information Services Technology,* Vol. 10 No.5, pp. 573–582.

Kennedy, S., Whiteman, G. and van den Ende, J. (2017), “Radical innovation for sustainability: The power of strategy and open innovation”, *Long Range Planning,* Vol. 50 No.6, pp. 712–725.

KIA. (2022). Annual Report. Seoul: KIA Motors, available at: https://www.kianewscenter.com/news/kia-announces-1q-2022-business-results/s/fc3e7008-3f3c-4537-a19c-112634dca701 (Accessed on 16 May 2022).

Kim, H. (2020), “Analysis of how Tesla creating core innovation capability”, *International Journal of Business and Management,* Vol. 15 No. 6, pp. 42–61.

Kim, J., Paek, B. and Lee, H. (2022), “Exploring innovation ecosystem of incumbents in the face of technological discontinuities: Automobile firms”, *Sustainability,* Vol. 14 No. 2, pp. 1606–1622.

Klarin, A. (2019), “Mapping product and service innovation: A bibliometric analysis and a typology”, *Technological Forecasting and Social Change,* Vol.14 No.9, pp.119–137.

Lang, J.W. and Reber, B. (2021), “How Tesla created advantages in the EV automotive paradigm, through an integrated business model of value capture and value creation”, Business and Management Studies: An International Journal, Vol. 9 No.1, pp. 385–404.

Lang, J. W., Reber, B. and Aldori, H. (2021), “How Tesla created advantages in the EV automotive paradigm, through an integrated business model of value capture and value creation,” *Business & Management Studies: An International Journal,* Vol. 9 No. 2, pp. 385–404.

Ledbetter, P. (2018), “The Toyota template: The plan for just-in-time and culture change beyond lean tools”, *Productivity Press,* Berlin, available at: http://dspace.vnbrims.org:13000/xmlui/bitstream/handle/123456789
/4691/The Toyota Template: The Plan for Just-In-Time and Culture Change Beyond Lean Tools.pdf?sequence=
1&isAllowed=y (Accessed on 16 May 2022).

Lienert, P., Shirouzu, N. and Taylor, E. (2020), “The Musk method: Learn from partners then go it alone”, Neuters, September 17, 20208, available at: https://www.reuters.com/article/us-tesla-batteryday-technology-insight-idUSKBN2680K4 (Accessed on 16 May 2022).

Liker, J. K. and Franz, J. K. (2011), The Toyota Way to Continuous Improvement: Linking Strategy and Operational Excellence to achieve Superior Performance, McGraw Hill, New York, NY, available at: https://www.amazon.com.

au/Toyota-Way-Continuous-Improvement-Operational-ebook/dp/B004W2O8O6 (Accessed on 16 May 2022).
Liua, J.H. and Zhan, M. (2017), "Innovation model analysis of new energy vehicles: taking Toyota, Tesla and BYD as an example", 13th Global Congress on Manufacturing and Management. *Procedia Engineering,* Vol.174, No.20, pp. 965–972.
Liu, F., Chow, I. H., Zhang, J. and Huang, M. (2019), "Organizational innovation climate and individual innovative behavior: Exploring the moderating effects of psychological ownership and psychological empowerment", *Review of Managerial Science*, Vol. 13 No.4, pp. 771–789.
Llanes, G. (2019), "Competitive strategy for open and user innovation", *Journal of Economics & Management Strategies,* Vol.28 No.1, pp. 280–297.
Lune, H. and Berg, B. L. (2017), Qualitative Research Methods for the Social Sciences, Pearson, New York, NY, available at: http://law.gtu.ge/wp-content/uploads/2017/02/Berg-B.-Lune-H.-2012.-Qualitative-Research-Methods-for-the-Social-Sciences.pdf (Accessed on 16 May 2022).
Matta, C. (2021), "Philosophical paradigms in qualitative research methods education: What is their pedagogical role?", *Scandinavian Journal of Educational Research,* Vol. 4 No. 9, pp. 166–192.
McMillan, C. (2018), "Organizational Identity, Corporate Strategy, and Habits of Attention: A Case Study of Toyota", *Strategic Management,* Vol.9, No.2, pp.99–110.
Monden, Y. (2019), Toyota management system: Linking the seven key functional areas, Routledge, New York, NY, available at: https://doi.org/10.4324/9780203735350 (Accessed on 16 May 2022).
Nkomo, T. (2022), "Analysis of Toyota Motor Corporation", London: Motor Trends, available at: https://scholar.harvard.edu/files/tnkomo/files/analysis_of_toyota.pdf (Accessed on 16 May 2022).
Perkins, G., & Murmann, J.P. (2018), "What does the success of Tesla mean for the future dynamics in the global automobile sector?", Management & Organisational Review, Vol. 14, No.6, pp. 471–480.
Phillips, J. (2006), An Innovation Process and Software Framework, *Urban and Regional Innovation Research, Aristotle University of Thessaloniki,* Thessaloniki, available at: https://www.urenio.org/2006/11/14/an-innovation-process-and-software-framework/ (Accessed on 16 May 2022).
Prahalad, C.K. (2006), The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits, Pearson Education, Upper Saddle River, NJ, available at: https://knowledge.wharton.upenn.edu/article/the-fortune-at-the-bottom-of-the-pyramid-eradicating-poverty-through-profits/ (Accessed on 16 May 2022).
Seelos, C. and Mair, J. (2017), Balancing Innovation and Scaling over Time, *Standford University Press, New York,* NJ. (Accessed on 16 May 2022).
Segal, E. (2020), "Leadership lessons from Elon Musk and his tweet about twitter", Forbes Magazine, available at: https://www.forbes.com/sites/avivahwittenbergcox/2022/06/24/roe-dies-america-divides--and-it-aint-all-about-women/?sh=140c96774da6. (Accessed on 2 March 2022).
Shipley, L. (2020), "How tesla sets itself apart", Boston, *Harvard Business Review,* available at: https://hbr.org/2020/02/how-tesla-sets-itself-apart (Accessed on 2 March 2022).
Simnica, M. (2022), "The Connection Between Marketing and Innovation: Toyota Case Study", International Journal of Economics, *Commerce and Management,* Vol. X, 7, pp.289–301.
Song, J. (2022), "Quantitative Analysis of Tesla Inc. in the Context of the Covid-19," Proceedings of the 2022 7th International Conference on Financial Innovation and Economic Development (ICFIED 2022), Advances in Economics, *Business and Management Research,* Vol. 648, No. 2, pp.662–666.
Suchek, N., Fernandes, C. I., Kraus, S., Filser, M., & Sjögrén, H. (2021), "Innovation and the circular economy: A systematic literature review", *Business Strategy and the Environment,* Vol. 30, No.8, pp.3686–3702.
Stadler, C. (2011), "Process innovation and integration in process-oriented settings: The case of the oil industry", *Journal of Product Innovation Management,* Vol.28 No.s1, pp. 44–62.
Stewart, T.A. and Raman, A.P. (2007), "Lessons from toyota's long drive", Boston, *Harvard Business Review,* available at: https://hbr.org/2007/07/lessons-from-toyotas-long-drive (Accessed on 2 March 2022).
Strobl, A., Matzler, K., Nketia, B. A. and Veider, N. (2020), "Individual innovation behaviour and firm-level exploration and exploitation: How family firms make the most of their managers", *Review of Managerial Science,* Vol.14 No. 4, pp. 809–844.
Szutowski, D. and Szułczynska, J. (2017), "Exploring companies' innovation policies in the industrial sector in Central and Eastern Europe", Journal of Management and Business Administration. *Central Europe,* Vol. 25 No.4, pp. 158–176.
Takeuchi, H., Osono, E. and Shimizu, N. (2008), "The contradictions that drive toyota's success", Boston, *Harvard Business Review,* available at: https://hbr.org/2008/06/the-contradictions-that-drive-toyotas-success (Accessed on 2

March 2022).
Takeshi, N. (2022), "Business Briefing", Tokyo: Toyota, available at: https://www.toyota-boshoku.com/global/company/_assets/upload/2022_Business%20Briefing%20with%20Script_e.pdf (Accessed on 16 June 2022).
Teece, D.J. (2018), "Tesla and the reshaping of the auto industry", *Management and Organization Review,* Vol. 14 No. 2, pp. 501–512.
Teece, D. (2018). Profiting from innovation in the digital economy: enabling technologies, standards, and licensing models in the wireless world. *Res Policy* 47(8):1367–1387.
Tesla. (2020), "Tesla Announces Updates to 2020 Annual Meeting of Shareholders and Battery Meeting Day Events", Available at: https://www.tesla.com/ns_videos/2019-teslaimpact-report.pdf (Accessed on 28 June 2022).
Tesla. (2022), "Tesla living is vision statement", available at: https://www.tesla.com/(Accessed on 16 March 2022).
Tesla. (2022). Annual Report. Austin: Tesla, available at: https://stocklight.com/stocks/us/manufacturing/nasdaq-tsla/tesla/annual-reports/nasdaq-tsla-2022-10K-22595227.pdf (Accessed on 16 March 2022).
Tiberius, V., Schwarzer, H. and Roig-Dobónb, S. (2020), "Radical innovations: Between established knowledge and future research opportunities", *Journal of Innovation & Knowledge,* Vol. 6 No.1, pp. 145–163.
Tidd, J. and Bessant, J.R. (2021), Managing Innovation: Integrating Technological, Market and Organizational Change, Wiley, London, UK, pp. 221–252.
Tomlins, R., Oksana, M., Sukumar, A., Rao, M. and Pandya, K. (2021), "Radical innovation process in sustainable development and knowledge management: Toyota Prius case study", IOP Conference Series: *Earth and Environmental Science,* Vol. 2 No.2, pp. 19–45.
Toyoda, A. (2022), "The Toyota Global Vision", Tokyo: Toyota, available at: https://global.toyota/pages/global_toyota/ir/library/corporate-governance/corporate_governance_reports_e.pdf (Accessed on 28 June 2022).
Toyota. (2022). Annual Report. Tokyo: Toyota", available at: https://www.toyota-industries.com/investors/item/2022_annual_financial_report_E.pdf (Accessed on 16 May 2022).
Valdeson, A., dos Santos, L.I.C. and Marcos, A.G. (2021), "Innovation activities in precision agriculture in Brazil as a sustainability strategy in agribusiness", *Revista Humanidades e Inovacao,* Vol. 8 No. 50, pp. 19–46.
Wu, Z., Wang, M., Zheng, J., Sun, X., Zhao, M., & Wang, X. (2018), "Life cycle greenhouse gas emission reduction potential of battery electric vehicle", *Journal of Clean Production,* Vol. 19, No.6, pp. 462–470
Xiaofei, D. and Bingcan, L. (2021), "Analysis of Tesla's marketing strategy in China", Advances in Economics, Business and Management Research, Vol. 203, Proceedings of the 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021).
Yuhang, L., Jinru, L. and Shuning, X. (2021), "Analysis of Tesla's business model: A comparison with Toyota", Advances in Economics, Business and Management Research, Vol. 190, Proceedings of the 2021 International Conference on Financial Management and Economic Transition (FMET 2021).