

Evaluating the Impact of Regulations and Alliances on the Sixth Generation of Technology and Innovation Management

Dr. Karim Mualla (*Author*)
School of Informatics
University of Leicester
Leicester, United Kingdom
kjm49@le.ac.uk

Sameen V. Puri (*co-Author*)
School of Informatics
University of Leicester
Leicester, United Kingdom

Krishan Raithatha (*co-Author*)
School of Informatics
University of Leicester
Leicester, United Kingdom

ABSTRACT

Technology management in recent years has proven that today's success is the enemy of tomorrow's success. Recent technology management examples show that the unstable, and rapidly evolving innovation virtuous cycle spins faster than ever in nearly all industries. In the last two decades, the technology market has seen hyper successful companies such as Nokia and Kodak, suddenly and drastically lose market edge. These firms have failed not for the lack of abundant R&D resources, top employees, or in-depth market knowledge. This shortcoming was due to overlooking crucial innovation opportunities to abandon internal and current successful paths and business models, and exploit radical and disruptive innovations for future competitive advantage. These companies, amongst others, were busy managing daily processes of current clients, instead of envisioning future opportunities. This negligence has affected the balance of disruptive innovations which either increases the customer value of a product or a service, or lowers their cost, and therefore creates a competitive advantage. This paper evaluates through recent case studies, the correlating impact of regulations and alliances on the sixth generation of Technology Innovation.

KEYWORDS

Management Information Systems; Open Innovation; Decision-making; Technology Management;

1. INTRODUCTION

The technology sector has seen growth in recent years and this uptake is only expected to continue [1]. Technology is being developed at a rapid pace and as such, innovation management frameworks are changing too. This paper will discuss some of the recent trends in innovation and question why they are occurring.

As technology advances over time, it is likely that innovation models require constant updates to reflect this rapid pace. Rothwell proposed an early innovation model in 1994 [2]. It essentially describes the journey from entering the market with an innovation (technology push) to eventually becoming an established name or product. As companies develop, each takes various actions such as integrating all aspects of internal businesses and forging bonds with relevant stakeholders, thus progressing through the innovation model. The fifth generation is

where companies produce innovations continuously as well as networking heavily with external parties. Generations can overlap and latter generations are not restricted to larger firms exclusively.

Open innovation is the process of working even more closely with external parties and sharing knowledge. This practice has gained traction in recent years [3] and is the opposite of traditional closed innovation, where companies work in isolation when developing an innovation. Chesbrough defined the open innovation model [4], identifying benefits such as accelerating innovation internally [5]. This paper will examine whether open innovation is indeed a part of the fifth generation of the innovation model or whether it constitutes a further sixth generation.

Continuing with the above theme, as companies develop, they form strategic alliances with other companies. This would likely occur in the fifth generation of the model where much networking occurs. One notable alliance was formed between Spotify and Uber [6]. In a world where companies are often competing to be the biggest name, this is quite an interesting move. Consequently, this study will examine why technology firms have become more reliant on forming alliances in recent years.

In most countries, innovations that proceed to market share must meet the exacting standards of various bodies and regulators. Innovators must consider what they are constrained to doing by regulations, yet also by the very nature of their work; how boundaries might get pushed as far as possible or even exploit loopholes in regulations. Simply put, regulations can open and close doors to innovators at the drop of a hat. Research has supported the idea that regulations affect innovation. Blind, Petersen and Riillo [32] found a relationship between the two factors in a model they studied. This research will consider whether innovation comes from the heart of companies, at firm level, or whether it is driven by regulators.

The ride-hailing app Uber launched in 2009, fundamentally changing the taxi industry. The

concept was simple, all one had to do to call a taxi was use the app. They could do this on the spot at their location, rather than having to call a minicab firm or hail a London style taxi, which was the norm. It was recently estimated that globally, 93 million people use the app monthly [7]. If there was ever an example of a disruptive innovation, Uber is considered a suitable example, as they have virtually monopolised their industry.

2. BACKGROUND

Technology firms must constantly stay up to date and relevant due to the ever-changing and rapidly-paced market, otherwise they face the risk of falling into obscurity behind rivals and competitors. Innovation is a major source to the generation of new knowledge which results in potential success.

It is hard to define innovation as it can be interpreted in many ways; Steve Jobs famously stated that “innovation distinguishes between a leader and a follower”, whereas Tidd and Bessant mention that “innovation is driven by the ability to see connections” whilst serving both new and established markets. Regardless of the constructed definition, it is widely accepted that innovation is vital to the improvement of technology firms and that it is critical to have a robust innovation strategy. Tidd and Bessant highlight Rothwell’s five generations of innovation models, with each generation more complex compared to the previous. The first and second generations are a simple linear model which involves a need-pull approach vs technology-push approach, resulting in innovation relating to products or services which will fulfil needs and new technological opportunities, respectively. The third generation is a coupling model which integrates development, manufacturing, and marketing to the previous models. Rothwell’s fourth generation was inspired from Japanese innovation by introducing integration and parallelism [36], whilst the fifth generation highlighted the “flexible use of integrated networks and systems” [33]. The fifth generation also introduced collaborative joint R&D ventures and alliances, resulting in rapid and

efficient development [34]. Marinova and Phillimore [35] state that the fifth generation is inspired from Darwin's natural selection evolution theory – variety in the innovation process results in a free market. They also explore their sixth generation of innovation which requires “interaction networks and innovation systems”, emphasising the importance of the innovation milieu for small and medium enterprises, which may lack resources for aggressive R&D strategies. The sixth generation stresses inflows and outflows of knowledge to accelerate internal innovation [38], and competitive advantage can be a result from multiple R&D strategies, with influences outside the organisation.

Open innovation is a method of innovation where both internal and external inputs contribute to a business model. Lee et al. outline multiple advantages of open innovation between SMEs and larger firms, particularly the access to external resources and assets which would otherwise be unavailable, as well as being able to extend technological competences. The concept of open innovation relies on a symbiotic relationship between smaller and larger firms, where the larger firms focus on R&D and SMEs focus on commercialisation [39]. In the modern day, smarter firms know that it is nearly impossible to have a foot in every research field, and so managing these networks, extensive links and relationships with other players is crucial [40]. However, there are arguments against open innovation which Tidd and Bessant (2009) [41] highlight, such as being able to control the information and holding competitors back, as well as intellectual property concerns.

Confining open innovation into a specific generation of innovation models is a tough task. In fact, it is not uncommon for an innovation strategy to be branched under two different generations. In the case of open innovation, it is widely known that it exceeds the characteristics of the fifth generation and is the foundation for the sixth generation [37]. As explained earlier, the fifth generation of innovation is driven by systems

integration and extensive networking between other firms, whereas the sixth generation builds upon this and is not just limited to single

R&D unit, and instead external idea generation and solutions are a crucial aspect of developing a solution to the market.

3. LITERATURE REVIEW

With disruptive innovations as the previous discussion illustrates, the outside world is to some extent on the back foot from the start, including regulatory bodies. Most companies were not expecting apps such as Uber to revolutionise the industry in the way that it has. For those masterminding Uber, they were simply exploiting the fact that there was no concept like it. As such they entered a new area of the market and created new demand, which current regulations such as those in the United Kingdom, did not cater for. Uber faced major issues with regulators about the employment status of their drivers [8], amongst other things. These grey areas in legislation were only really identified when Uber entered the market as the environment in which they operate is vastly different to the then norm. Means and Seiner went so far as to say that all existing laws relating to workers for firms like Uber may need to be rethought going forward, as a direct result of a changing technological world which is shifting employment norms.

Uber has formed strategic alliances with other large companies during their rise to the top, in line with innovation models. In 2014, Uber partnered up with Spotify to offer passengers the opportunity to choose their music during a journey [9]. Spotify is the largest audio streaming service with a staggering 345 million users [10]. Clearly, there are parallels between Spotify and Uber in that they are major players in their respective industries. Their customers are very likely to have both apps installed on their smartphone and thus the benefit is mutual. The notion that any gains should be mutual is a key factor used to advise companies on forming alliances [11]. For the companies, this service is another way of

seamlessly integrating themselves into the daily lives of their consumers.

Uber and Toyota have had an alliance for some time, and from this relationship has arisen opportunities for open innovation. Both companies will be sharing their own autonomous vehicle technology and integrating it into bespoke Toyota cars [12]. With much attention in this area and brands like Tesla leading the way, this move means that Uber will not be far behind. The companies have increased their market opportunity by increasing eventual exposure. Chesbrough [42] specified that open innovation can 'expand the markets for external use of innovation', which is similar to how Uber and Toyota are operating.

Incremental innovation describes a company offering small, desired updates to an existing product, rather than 'reinventing the wheel', which is considered a radical innovation. Airlines purchase aircraft from companies like Boeing and Airbus. Airlines typically prefer to have as few types of aircraft in their fleet as possible. This cuts costs because staff such as pilots, cabin crew, engineers and more only need to be trained on one type of plane. To begin operating an entirely new aircraft would mean a multi million-dollar cost. Therefore, incremental innovations are perhaps more important in this industry than any other.

The Boeing 737 is a 50-year-old plane, still in operation today [13]. Albeit today's model is an updated version of the original, the result of a series of incremental innovations. Recently, there has been demand from airlines to use smaller planes, like the 737, to service low demand, long-haul routes. This moves away from the hub and spoke model of aviation to the point-to-point model [14]. In 2011, Boeing announced the latest version, the 737 MAX. Tragically, the 737 MAX had two fatal crashes and was subsequently grounded in March, 2019. The events that played out here typify just why the subject matter of this study is considered important, as will be discussed further.

As the 737 MAX was a complex innovation, Boeing may have been swayed towards using closed innovation. Whilst they would have networked with suppliers in acquiring separate components for the aircraft, they did not share the 'big picture' idea with any external sources. Insiders claim Boeing rushed the design [15], placing the engines higher up on the wing, which fundamentally changed the way the aircraft handled. Open innovation could have benefited Boeing, perhaps allowing them to refocus internal resources on managing the implementation, a strength of the methodology, identified by Docherty. Potentially, the lack of innovative relationships from outside the company contributed to disaster.

As a major company, Boeing has good relationships with its customers. One of their alliances was with American Airlines - AA (Boeing, n.d.) which exclusively operated their planes. In 2011, AA ordered from Airbus for the first time. Interestingly, AA also placed an order for an 'expected new evolution' of the 737 [16], an aircraft that was yet to be officially announced! The rivalry between Boeing and Airbus was considered fierce as it was a given that Boeing would create a new aircraft to keep up with their competitor. It seems Boeing were reliant on the alliance as they did not believe that AA would ever order from their rivals. It could be that industries dominated by a handful of companies are liable to rely on alliances. This could mean that over time imbalances of power emerge, breaking a key rule of successful alliances identified by Bamford, Gomes-Casseres and Robinson in 2003 [17].

Boeing's good relationships extended to aviation regulators, the FAA. Over time, the FAA had given increasing levels of responsibility to Boeing, allowing them to perform safety checks that they once would have undertaken themselves [18]. With their influence over the FAA and an exemplary safety record, this was not highlighted. It seems Boeing almost had an alliance with the FAA, clearly an inappropriate relationship. It can

be observed that the dangers of when mega-companies cross the boundaries with regulators. The discontinuous innovation of the 737 MAX clearly occurred at the firm level with complete disregard for regulations. It may be that companies such as Boeing, economic powerhouses, feel like they can innovate with no thought for regulations. As such, this paper evaluates whether regulations only impact innovation at smaller and medium sized corporations where they do not hold a certain stature in the eyes of regulators.

4. ANALYSIS

Today, Amazon is the largest retailer in the world [43]. In March 2021, the company launched a UK based grocery store, Amazon Fresh [19]. A novel concept, where shoppers simply pick up items from the shelves and leave the store, upon which time they will be automatically billed. Artificial intelligence (AI) technology is behind this sustaining, yet radical innovation. Amazon is providing indirect competition to other supermarkets by launching this technology. The technology has been named 'Just Walk Out' (JWO) [20]. A red ocean strategy has been employed here, whereby Amazon is competing in a saturated market and aiming to capitalise on existing demand.

Amazon has an alliance with the supermarket chain Morrisons [21]. This partnership allows Amazon customers to order Morrisons groceries and receive same day delivery. A common trend with alliances like these, is that they are always focused on giving the consumer a seamless experience. With firms becoming more reliant on alliances, we may see an extension of this partnership. Amazon is offering to implement the JWO technology in other supermarkets, a conscious attempt at open innovation. With Morrisons already an alliance, we may see open innovation between the two companies, as a result of the existing partnership. Morrisons already operate stores nationwide and Amazon could implement their JWO technology into them. From here they could see how the technology is received

by customers, eliminating the need to build stores from scratch. This is a key benefit that Docherty [44] identified, whereby open innovation allows companies to 'conduct strategic experiments at lower levels of risk and resources'.

To get a project like this 'off the ground', Amazon would have consulted with regulators. With the vast data footprints created by tracking people in this manner, it is understandable that people may have concerns. At present the technology does not involve facial recognition [22], however this is not to say that Amazon will not look at this area going forward. With JWO technology being aligned with smaller convenience stores, a different approach may be needed for larger stores, like the ones operated by supermarket giants, such as Tesco. With controversy around the use of facial recognition in the UK [23], Amazon may have to work with regulators in this area. As a large company with many offices, they will likely have entire departments devoted to this type of work and working with regulators should not be a problem. To go against regulatory bodies and simply innovate with no concern for legislation would undoubtedly tarnish Amazon's good reputation.

The study has observed that technology companies have become reliant on forming alliances in recent years. This is mainly observed due to numerous industries becoming dominated by a smaller number of ICT firms, who almost monopolise the sector.

With so much direct competition between companies, firms may feel as if they must 'pick sides' when rivalries are so intense. The Boeing 737 MAX project illustrates why this can have negative impacts, in particular the alliance Boeing had with AA. Technology firms are highly specialised in their field and appreciate the fact that the same is true for other companies. As such it is better to work with them, forming an alliance, rather than attempting to outdo them in starting a new venture from scratch and in isolation. For example, if Uber had launched its own music service instead of working with Spotify, it is

likely to have failed, as people have built up their personal profile on apps like Spotify. Moreover, technology firms realise that attempting to force a consumer away from a brand they have used for years is likely to be futile, an alliance would be more beneficial. This idea was supported by Ohmae in 1992 [24].

Many visible alliances are formed between well established, larger companies, often in the latter stages of any innovation model. From companies like Toyota and Uber, we can see that an initial alliance can provide a pathway to open innovation. As the study observed, Toyota and Uber are now working together in innovating self-driving technology. This is down to increased collaboration and areas of expertise coming together in a productive way. It may be that upon forming an alliance, companies gain a heightened respect for what the other does and realise just how much value could be had in working collaboratively. This then gives rise to open innovation, providing the opportunity for lucrative profits. With Amazon and Morrisons, we may see the former bringing their research and development knowledge (R&D) to the table, whilst the latter assist with marketing and gathering consumer insight. Docherty [25] suggests that joint ventures and alliances can determine the success and ultimately survival of a company. With alliances and partnerships on the rise, this paper perceives that this will naturally lead to an open innovation 'boom' in the coming years.

Accordingly, it can be stated that innovation models do require a sixth generation, a finding echoed by research such as that of Kotsemir and Meissner in 2013 [26]. Furthermore, the fifth generation of the innovation model which places an emphasis on networking is best placed for the forming of alliances. As described, alliances often lead to open innovation between two parties. A sixth generation is therefore constituted, making Rothwell's pioneering 1994 model [27] outdated at the present time.

In relation to whether regulation impacts upon innovation, or whether it simply occurs at firm level, the answer is somewhat convoluted and linked to the innovation model. This paper suggests that radical and disruptive innovators, often engaging in closed innovation and focusing on the first generation of the innovation model, have little time for the regulations that supposedly govern them. This is because these types of innovations are usually new and a 'grey area' in terms of legislation; Uber is a good example of this where they were more focused on the R&D side of the innovation. A company like Amazon on the other hand, will have entire departments devoted to following regulations, not to mention a desire to uphold their reputation. Some may argue that Boeing defied this in many ways, however, lessons have been learnt and this was deemed an exceptional case.

Philips is a company known around the globe, developing and manufacturing multiple, high quality household items which is utilising the open innovation methodology effectively; MiPlaza is an open innovation research lab in Eindhoven that allows third parties to develop using Philips' facilities, in exchange for non-application specific knowledge obtained [45]. This allows for smaller firms that may not have the access to technological assets to still innovate and develop, whilst also benefiting Philips.

Collaboration in the technological field can result in many advantages; Tidd and Bessant explore some of the reasons, particularly reducing risk, cost, and time. Firms can rely on the expertise and assets of others to innovate and develop products or strategies together to achieve a common goal. A recent example of this is the Alliance for Open Media, whose vision is to provide an efficient and royalty-free video codec, aimed for streaming media over the internet. Currently, the industry is dominated by Moving Picture Experts Group (MPEG), which develops popular codecs such as MPEG-4 Part 10 (AVC or h.264) and MPEG-H (HEVC or h.265), where vendors must pay fees to encode and decode this format. Many technological giants such as Amazon, Apple,

Google, Microsoft, and Netflix are working together to develop AV1 – a royalty free video codec. Although these companies are normally competitors, they are collaborating to provide a better solution which will collectively save millions, if not billions, of dollars in the future [46]. Tidd and Bessant (2009) outline this as a major advantage of alliances, where they are “more likely to create standards and achieve dominant positions” which can be seen with this alliance. They cite Ericsson and GSM standards, as well as VHS, CD and DVD.

Alliances are also for firms to branch out into markets they otherwise would not be competing in. In 2021, OnePlus partnered with Hasselblad for its OnePlus 9 series of phones, where the camera modules featured promising photographic capabilities and performance. This allowed OnePlus to reach out to Hasselblad’s high end camera and lens market, whilst get a foot in the door to the phone market.

In fact, the phone market seems to be somewhat saturated with alliances and collaboration; Google and HTC collaborated to make the Google Pixel smartphone. At this point, HTC was losing their market share due to a massive competition and aggressive pricing, and so working with Google to manufacture a phone was ideal for them. After the success of the Google Pixel, Google had decided to acquire the smartphone aspects of HTC for over \$1 billion, which could be a win-win scenario.

Google gets access to experienced staff and manufacturing capabilities, whilst HTC gets paid generously for leaving a saturated market in which they were failing.

5. IMPACT AND DATA EVALUATION

For large and established companies, often utilising the latter generations of innovation models, the relationship with regulators is in most studied cases a two-way street. Regulators are ultimately responsible for keeping people safe, however, a consideration must take place in relation to both the short, and long term roadmap.

This is where hidden ethical issues may arise. For example, one focus of transport regulators will be on reducing the amount of road deaths. In the long term, the solution to this may be autonomous vehicle technology [28]. Ultimately, many more years of development is needed before this type of technology becomes the norm. However, if regulators stopped companies like Toyota and Uber from testing vehicles on public roads due to the risk of accidents, some may say that they are being counterintuitive in their attempt to make roads safer in the long term. As such, there is an extremely difficult balance to be struck. Another good example is the 2035 banning of non-electric cars in the UK [29]. A policy like this may aim to eventually improve air quality and people’s health. As such, regulators cannot constrain innovators too much with outdated regulations, when both parties are pursuing the same end goal. The dangers that come with too much of a collaborative relationship between regulators and innovators is illustrated by Boeing and the FAA, so this must also be considered. Whilst regulators are ultimately independent of innovative technology companies, they do require an ‘innovation culture’ to a certain degree, which has positive impacts [30].

Spotify, a popular music streaming service, and Uber, a ride-hailing taxi company, formed a partnership in 2014, where Uber customers can easily listen to their own music whilst riding in an Uber. This integration was seen as a win-win where Spotify’s users may be more inclined to use Uber’s services, whilst frequent Uber customers may decide to use Spotify for the ease of access [47]. However, over time this partnership may have turned sour - recently Uber has had criticism, which Spotify may not want to be associated with [48]. This case highlights a potential negative against alliances where you may be coupled with other firms, which has a risk of garnering negative feedback therefore lowering public perception of your own firm.

Alliances may be formed due to user experience; a recent feud between Amazon and Google meant

that YouTube was not available natively on the Amazon Fire TV stick, meaning that users would

have to use YouTube through the web browser [49]. This resulted in poor user experience for both YouTube and Amazon, potentially becoming a contributing factor whether a user would purchase a Fire TV Stick or a rival product. It was not feasible for Amazon to create and develop a competitor to YouTube due to its massive global standing and dominance, therefore it was imperative for this dispute to be solved.

In an age where there are a multitude of cloud-based services available to the public, it is nearly impossible for a single company to become a major and sole player in each market. Therefore, it is important for companies to collaborate to ensure products and services are freely available. Amazon's range of Alexa compatible devices have been succeeding in allowing other services to become similarly available. Users are able to set up 'skills' which allows other firms to integrate their own service into the Amazon Alexa assistant, for example being able to easily listen to Spotify or BBC sounds. Even though Amazon has its own music streaming service, by being able to include Spotify and other rivals, it means anyone can use the Alexa device and users are not forced to use a service they do not want to.

Technology firms relying on alliances can be case dependent – not every firm, or even market will rely on alliances to thrive. Apple innovates their products and services behind closed doors, yet they are the market leader for almost every product they release [50]. With the development of their own M1 chip, Apple is even less reliant on other firms, such as Intel and AMD, for their products, giving them full control over their devices.

Apple's situation is quite unique to them – not every company can afford to wall off their innovation from competitors and maintain multiple high-end R&D departments. As mentioned previously, it is unfeasible for a company to have their foot in every market, and so

alliances are an easy and effective way for this to happen, as well as being able to help their innovation process, as seen in the sixth generation of innovation, particularly having access to resources and technological assets they otherwise would not.

In 2009, Tidd and Bessant concluded that due to the ever-increasing technological demands, it is hard to “maintain in-house expertise in every potentially relevant technical area”, and that most R&D and project managers agree that they can no longer survive on a ‘technological island’. They further discuss decisions of ‘making or buying’ a technology, and how it relies on the transaction costs and the strategic implications. Multiple studies state that firms engaging in technological alliances perform better than those that do not [33], showing an obvious incentive towards alliances, particularly due to mechanisms to gain external knowledge. As outlined, this is one of the main benefits for open innovation and alliances as it allows for smaller firms to access technological assets for a reduced cost, giving them the option to focus on other aspects of the ventures.

Regulation is often seen as a barrier that hinders innovation, as it enforces rules that players need to abide by. However, this study suggests that this is not only considered a positive and a crucial aspect for innovation. “Regulation in this way provides a two-edged sword” [51], explains that there are both positives and negatives, which they further explain that although regulation closes off certain avenues of opportunity, it forces firms to think of new ways to solve problems and potentially opening new possibilities. They also introduce an excellent point where deregulation may “open new innovation space” and is considered a source of discontinuity where existing players may not be able to see new opportunities that open out.

Regulation may not be specific in how something needs to change, but instead specifies what needs to change [21], further amplifying the previous point where regulation may introduce more possibilities, allowing firms to look exactly where

and how they can innovate. In 2015, Engberg and Altmann's different studies showed that regulation allows firms to remain competitive by overcoming barriers, and that regulations should not be seen as an external barrier, but instead a focus for their requirements.

A study carried out by Song, Yang and Zhang in 2019 shows the effect of environmental regulation on technological firm innovation. They found that the regulation had "effectively promoted technological innovation", and that regulation can provide a "positive driving role" in innovation. They propose a series of guidelines that environmental regulations should follow, such as having measures specific to each local condition rather than having blanket and broad regulations. In this scenario, the regulations enforced did not hinder innovation, but instead allowed it to flourish.

In 2012, Blind explored the different potential regulations that affect innovation. Market entry regulation means that there are hurdles that companies need to jump to enter the market. This is positive for firms that are already in the market, as it reduces competition and so more capital can be spent on innovation. Accordingly, this study observes that similar effects could become negative as less competitors lead to less pressure on innovation. Whereas with regulations, if a new player joins the market, these companies will most likely reach an advanced level, which pressures pre-existing players to innovate in order to stay leaders. Merger and acquisition regulations limit "takeover pressure and incentives to innovate", but also has positives such as allowing for a smoother takeover process, as well as management protection from short-term market pressures.

Positive outcomes of regulation can include new innovative idea, new products or services, innovations brought to market quicker, increased investment, new businesses entering the market, and greater consumer confidence and engagement [11]. It is important for regulators to strike a balance such that innovation is enabled whilst meeting their objectives, and as technology

advances new players join the game, unique challenges are presented to the regulators to ensure public protection.

With the ever-increasing number of auto vehicles, it has been deemed important to reduce the amount of emissions, particularly CO₂ being released into the atmosphere. For a number of years, regulations have been imposed on car manufacturers to reduce the output emissions, with the resulting engines being 'greener' than the previous (CO₂ emission performance standards for new passenger cars and light commercial vehicles. Customers are also incentivised to purchase more efficient cars through grants, taxation, and emission zone charges. These regulations have not only resulted in a healthy ecosystem, but also forced these companies to innovate and provide industry-leading solutions. Currently, regulations in certain countries will prevent the manufacturing of petrol and diesel powered cars, and instead will force consumers to only purchase electric vehicles [38]. This is also a major source of innovation, as companies will have to adapt and develop new strategies in order to stay leaders, otherwise they risk falling behind current and potential new rivals. This is already starting to happen in 2021, where Tesla is the market leader for electric vehicles despite having a negligible impact on internal combustion engine cars [51].

Regulations do not always contribute to innovation positively, as many companies detest regulations because it means spending more money and time to deliver an alternative solution. GDPR is an EU-wide regulation which ensures that customer personal data is stored safely. This also gives more power to users who can now request to have their data deleted, changed, object to processing and request their data [43]. Although GDPR is extremely vital to consumers' privacy, technological companies were forced to implement services and solutions to follow this regulation otherwise they would face hefty fines.

6. CONCLUSION AND FUTURE WORK

This study suggests that a sixth generation of innovation model is necessary to demonstrate the linear shift towards open innovation, which is occurring in today's rapidly evolving technological market. Research suggests that the term will eventually become obsolete, as open innovation will become a fully integrated convention within management [31]. Intrinsically linked to open innovation and alliances are regulations, which have an important role to play in technological innovation. The extent to which they affect innovators depends on which generations of the innovation model are being utilised, and the type of innovation being created. This begs the question as to whether regulators should encourage open innovation as a rule, due to the benefits that it can bring to not just individual companies, but also society. This provides potential for future research to explore this impact further.

As outlined, while most research has previously concluded that regulation has not much impact on innovation as it occurs at the firm level, this paper disagrees, and instead proposes that regulation should influence innovation. Regulation at its core is the process of making sure that innovations and R&D follow a set of rules and guidelines, to ensure standards are met. Therefore, this paper considers the precious statement to be flawed in 2021.

Regulation has one of the biggest impacts on the innovation process. Although it is generally seen as a negative, This study concludes that regulation can mostly be a positive aspect towards innovation. This is because regulators are expected to act in the best interest of technological firms, while meeting their objectives. On this account, regulation should not be viewed as a roadblock, instead, it is expected to open new paths for creativity to travel through. Regulations also have the possibility of bringing new competitors to the market resulting in more competition and a stronger desire to innovate. Other advantages could include a quicker turnaround time, increased investment, and a larger idea generation.

It is widely considered that open innovation is seen as the sixth generation of innovation models, and this paper delved through the reasoning behind the motivation of alliances and collaboration between firms. Even though many companies may be rivals, a collective venture may result in advantages for the involved parties, such as the Alliance for Open Media. Regulations play a major part in innovation, and this study illustrates the potential gaps that should be mitigated to ensure new avenues for innovation.

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